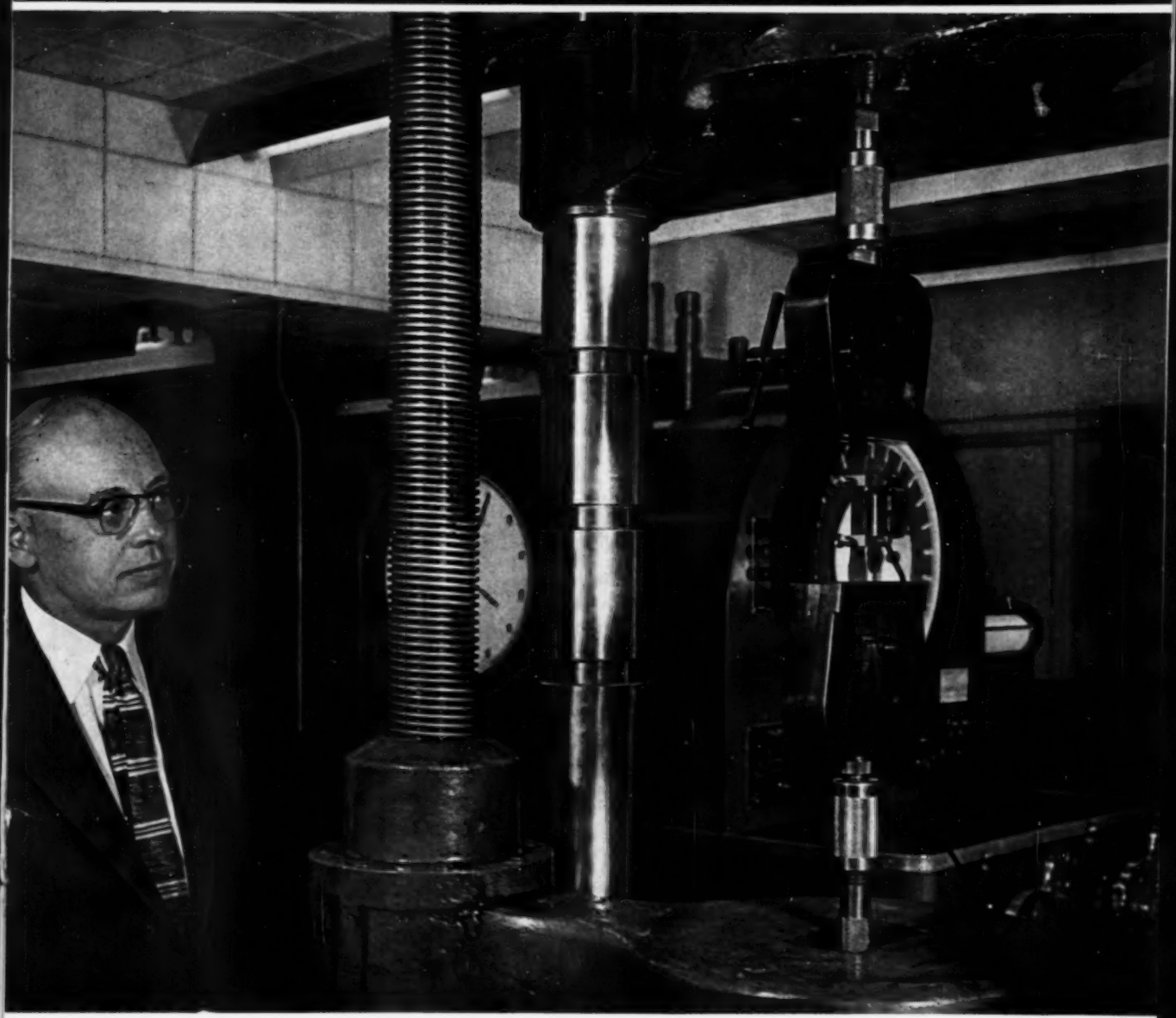
# American Machinist

AUGUST 25, 1958 75¢

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION


## Which fuel for flame cutting economy?

see page 69



Extensometer tests elongation on new steel — see page 2

- **New low-alloy missile steel combines air hardening, strength, and easier working,** page 72
- **Tricks with high-speed power quills,** page 81


NEWS INDEX page 49

CONTENTS page 1

# it's mainly a matter of TIMING!

## But how do you really KNOW when a machine has reached retirement age?

ANY machine tool could be made to last *forever* — if you kept on maintaining and repairing it forever. In fact, if you put enough money into its maintenance, you could keep it "good as new" indefinitely. But there's an economic limit to the maintenance money you can spend. And there also comes a time when "good as new" is no longer *good enough!*

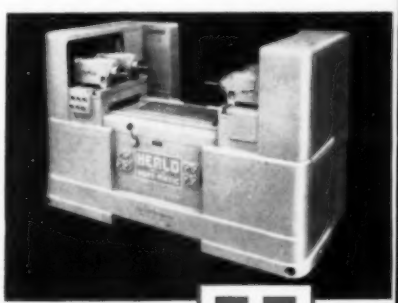
But, from the standpoint of production cost and return on investment, there *is* a mathematically predictable retirement age for any machine. Replacing it before this time is a waste of money. Retaining it *beyond* this time means a financial *loss* — often a substantial one!

Don't trust guesswork or rule-of-thumb computations to give you the right answer. There's too much money at stake.

Our sales engineers are well experienced in precise methods of replacement analysis. If you're in doubt — or would like to check your own figures — just call in your Heald engineer. He will be glad to help you. Similar obsolescence studies have effected many important savings.

***For example:*** A diesel engine manufacturer asked for a replacement analysis on a 10-year-old boring machine, used to finish the I.D. of cam roller followers. It was found that a Model 322 Bore-Matic, like that shown at the right, would do the same job *50% faster*, with the following annual savings in operating cost:

| | Old Machine | New Heald |
|---|---|---|
| Parts per hour | 187 | 280 |
| Parts per year (Req'd. Prod.) | 374,000 | 374,000 |
| Direct & Indirect Labor | $17,820 | $9,400 |
| Annual Maintenance | $750 | $200 |
| Annual Operating Cost | $18,570 | $9,600 |
| Annual Saving for New Machine | | $8,970 |



*YOU pay for obsolescence. Replacement pays for itself!*

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# American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION


## TRENDS


Spot news . . 49
Washintgon . . 51
Detroit . . 53
Aircraft and Missiles . . 55
Machine Tools . . 57
Materials . . 59
What's Ahead . . 61
News Report . . 67
Field Report . . 118


**Departments...**


Letters . . 44
Editorial . . 65
Practical Ideas . . 98
Talking Shop . . 97
Memos . . 97
New Equipment . . 101
Names . . 125


## contents for August 25, 1958


VOLUME 102, NO. 17



**Natural gas for lower cutting costs . . .** Results of a series of tests to determine the most economical fuel for oxygen cutting of steel. *By William J Semple, Pioneer Engineering Div, Poor & Co.* . . . . . **69**

**New low-alloy steel for missiles . . .** It combines air hardening, strength, and easier working than hot-work tool steels. . . . . **72**

**Conveyorized press line increases productivity by 17% . . .** And it is designed for quick re-arrangement when new press combinations are needed. *By Leo J Kevitt, Stewart-Warner Corp.* . . . . . **74**

**Vacuum cleaner prevents trapped slugs . . .** A domestic vacuum cleaner provides an economical way to tool for slug removal. *By Myron Howe and L F Dunphy, Westinghouse Electric Corp.* . . . . . **78**

**Tricks with high-speed power quills . . .** Flexibility is added for a wide variety of machining jobs with inexpensive quills. *By Ben C Brosheer* . . . **81**

**Tooling and technique build 880 jets . . .** Key tooling ideas in the new commercial jet transport. *By A E Hill, Convair-San Diego and George H De Groat.* . . . . . **84**

**Titanium gets glass coat . . .** To eliminate bottleneck in heat treating. Preparation time is cut from 30 hr to 1 hr. . . . . **88**

REFERENCE BOOK SHEETS

**True position tolerancing, IV, V, VI . . .** More on this important phase of dimensioning. *By Walter Harrington, Avco Manufacturing Corp.* . . . . . **91**

# American Machinist chips

***Cover...***

John Hodge watches elongation test on Airsteel. First details on this important development are at left.

***High-temperature Economy...*** Problems of the hypersonic age have seemed to call for tool steel as the only available material that could withstand the temperatures involved (see *AM*—Mar 10, '58, p106). Now comes a much leaner alloy (hence cheaper) that looks promising for many aircraft and missile parts. John M Hodge, research consultant, U S Steel, headed the group of metallurgists responsible for Airsteel, an alloy developed specifically for high-temperature aircraft and missile applications. For the exclusive story on this new steel and its characteristics, see page 72.

***Flame Cutting Cost...*** Pioneer Engineering in Minneapolis has made a thorough study of what it considers to be the two most promising fuels for oxygen cutting of steel plate: acetylene and natural gas. Pioneer made the tests because it could find no information providing a guide to choice. You'll find a report of the test results and enough information on the procedure to make tests of your own if these results aren't applicable in your plant. See William Semple's article on page 69.

***7 Ways to Save...*** Power quills provide an easy, inexpensive way to add flexibility to machine operations. Ben Brosheer rounds up seven examples of tricks with these high-speed units. Page 81.

***Press Tooling...*** A 17% increase in productivity at Stewart-Warner has been achieved by conveyorizing the press line. Flexibility was included to give quick re-arrangement when new press combinations are needed. See page 74. . . . An interesting way to clear trapped slugs by using a standard vacuum cleaner is reported on page 78.

***Transport Tricks...*** In this dawning missile age there are still planes to build and the new jet transports challenge the tooling ability of the builders. From Convair's San Diego plant comes a summary of the best ideas developed for the Convair 880, collected by Works Manager A E Hill. See page 84.

***Coming...*** *AM* for September 8 will present convincing proof that you don't have to have government backing to make use of numerical control — and at a profit. A thorough review of mechanical fastening devices will be provided in the Special Report. It will be a basic reference for you on this subject for years to come.


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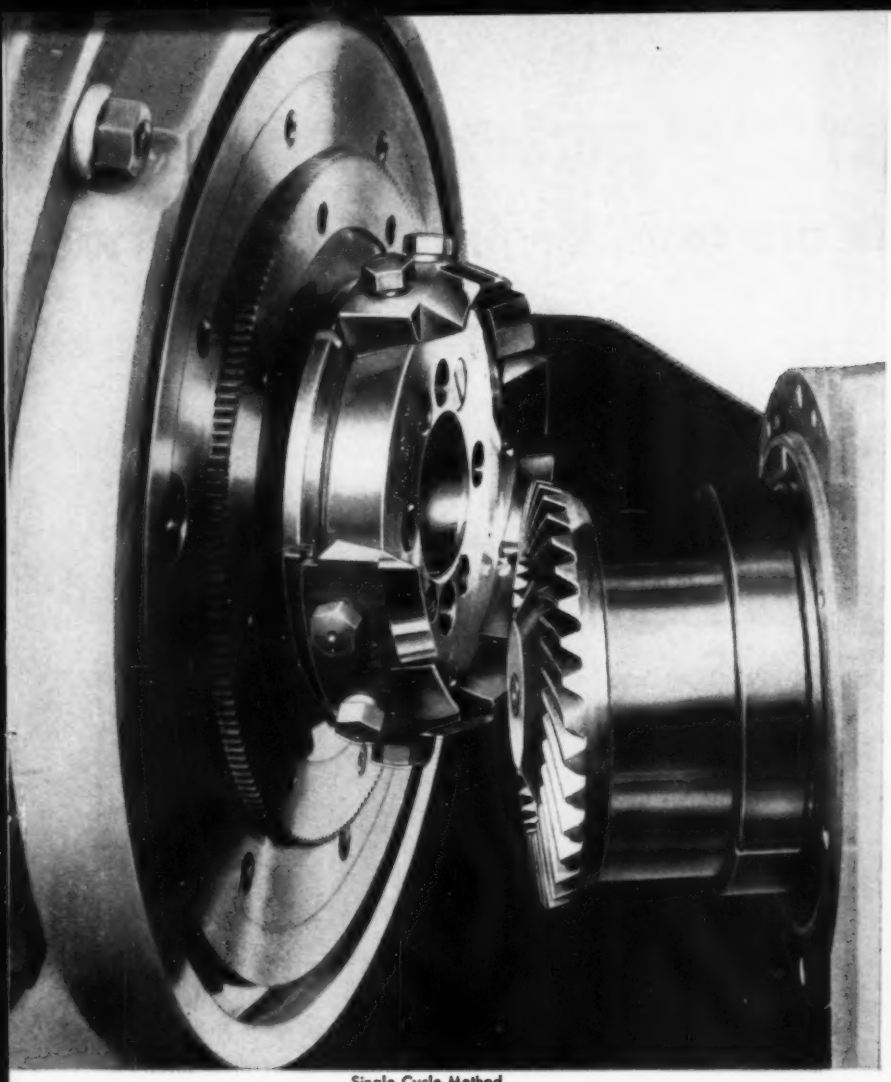
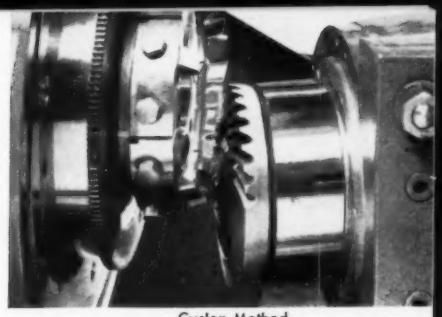
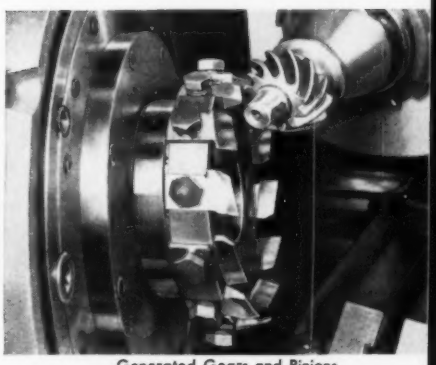


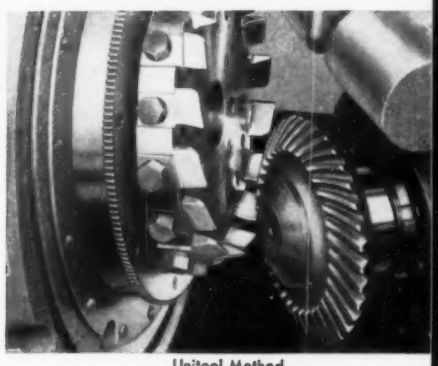
Single Cycle Method



Cyclex Method



Generated Gears and Pinions



Unitool Method

# Cut gears with *four* different methods on *one* machine

If you expect your gear needs to change over the years you'll appreciate the exceptional versatility of the Gleason No. 108 Hypoid Generator. With this one machine you can cut both gears and pinions by four different methods:

**Single Cycle® Method.** Using this method you can cut nongenerated gears four to five times faster than previously possible on machines of this type. Cradle and work head are locked in position. The last rotation of the Single Cycle Cutter finishes both sides of a tooth space. You cut the mating pinions on the same machine using the conventional single-roll Generating Method.

**Cyclex® Method.** For certain applications you can use the extremely fast Cyclex Method on the No. 108 Generator. You cut nongenerated gears in one completing operation from the solid blank.

**Generated Gears and Pinions.** You can produce both gears and pinions on this machine with the Generating Method. Here, a relative rolling motion takes place between gear or pinion and the rotating cutter.

**Unitool* Method.** If you want to cut small quantities of spiral bevel, Zerol® bevel, or hypoid gears with a minimum of tooling, you can use the Unitool Method. You cut both gears and pinions with a single cutter. This method is particularly useful for experimental gears for prototype work.

The No. 108 Generator cuts gears up to 8½" diameter at a 10:1 ratio and to a maximum of 4 DP. You can get the same versatility in cutting larger gears with the No. 118 Hypoid Generator which handles gears up to 18" diameter, 10:1 ratio, to a maximum of 2 DP. A third model, the No. 28 Hypoid Generator, cuts gears up to 33" diameter at 10:1 ratio, 1½ DP.

Send for free bulletins on all three machines.

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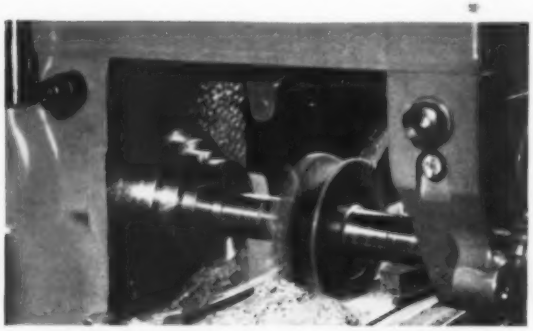
# Variety plus

## *Cincinnati MIs are tops for practically every*

Down milling holds thin parts down against the table or fixture; reduces in-process breakage of frail parts. Down milling is one of the many operations you can assign to CINCINNATI ML and MI Milling Machines, for all of them are equipped with Cincinnati's exclusive built-in backlash eliminator. While the table is feeding the work under or across the cutter this device automatically eliminates the backlash between the feed screw and nut; it automatically releases for all other conditions of table movement and adjustment. Other standard MI features to help you do a better job of variety milling include:

**16 spindle speeds, 25 to 1500 rpm. 16 feeds, ¼ to 30 ipm. Live power rapid traverse, 150 ipm. Single crank selection of spindle speeds and feeds. Dynapoise overarm smooths out the cutting action. Hand cranks automatically disengage; no spinning. Big selection of standard attachments.**

These and other Cincinnati advantages give CINCINNATI MLs and MIs top billing for 3 hp to 7½ hp milling operations. Get complete information by writing for a copy of catalog No. M-1995. Brief data in Sweet's Machine Tool File.

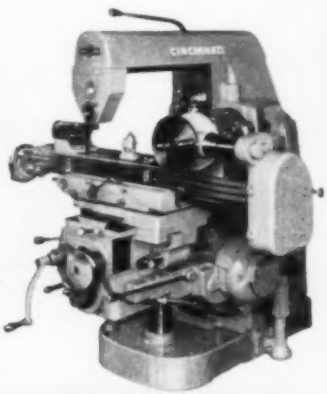


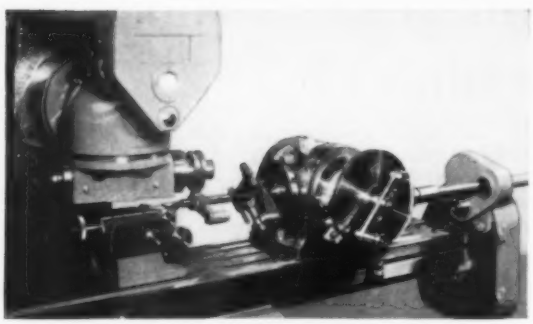
Aluminum and other non-ferrous metals requiring high cutting speeds can be efficiently milled on the MIs.

**CINCINNATI No. 2 MI UNIVERSAL MILLING MACHINE**

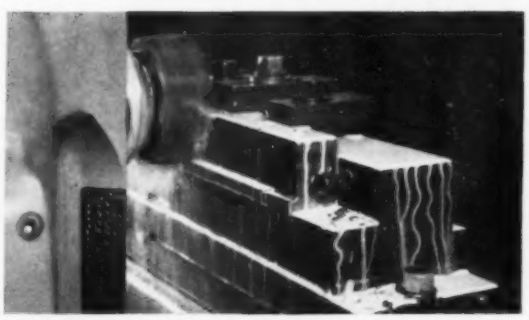
Catalog No. M-1995

CINCINNATI





Milling a helical tooth on the business end of a cast iron lever. The Universal Spiral Milling Attachment and Dividing Head are employed for this operation.

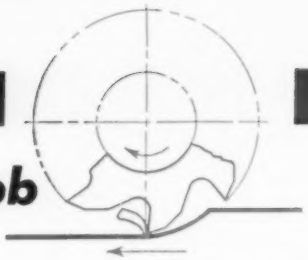


Taking a heavy cut in a steel vise jaw. CINCINNATI MI Milling Machines are constructed to assure the use of full motor hp at the cutter.

**CINCINNATI®** Knee Type Milling Machines • Bed Type Milling Machines

# . . . DOWN MILLING

## *toolroom milling job*



Down milling a thin part clamped to the machine table. As the cut progresses, the clamp on the exit end of the work is removed. Automatic Backlash Eliminator, an exclusive Cincinnati feature, makes down milling a routine operation.

**Die Sinking Machines • Cutter and Tool Grinders**

*Milling Machine Division*
**THE CINCINNATI MILLING MACHINE CO.**
**CINCINNATI 9, OHIO**

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# ELLIPTICAL AND

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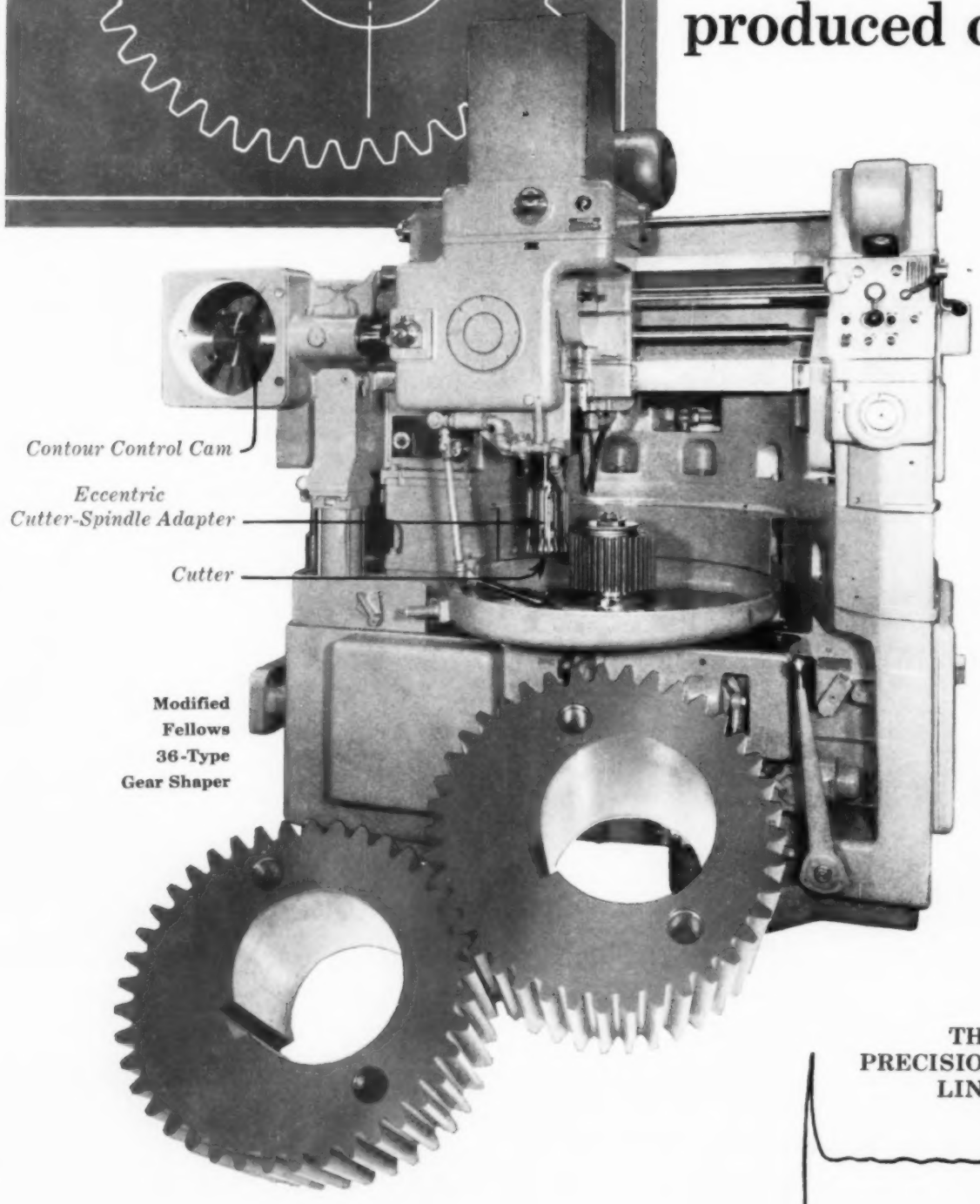


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# OVAL GEARS

## Fellows 36-Type Gear Shaper

Now... you can generate accurate oval and elliptical gears, and other irregular shapes, rapidly and economically. Once setup is made, production is as simple as in cutting conventional cylindrical gears. This new method minimizes the difficulty of wide variations in backlash experienced with such gears cut by previous methods. Full or modified involute teeth are produced to a higher degree of accuracy than was ever possible before on gears of this type.

Oval and elliptical gears are produced by continuously varying the center distance between cutter and gear during the cutting operation. A contour cam and a follower move the saddle the required amount in timed relationship with the rotation of the eccentric cutter-spindle adapter. The required pitch line contour of the gear is determined by the control cam and the eccentric adapter.

Although the Modified 36-Type Gear Shaper can be used to produce conventional external gears up to 18″ pitch diameter by substituting a cylindrical cam and concentric cutter adapter, it is primarily a special purpose machine for oval and elliptical gears. Special stroke parts are required for cutting face widths from 6″ to 10″. For full information, get in touch with any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
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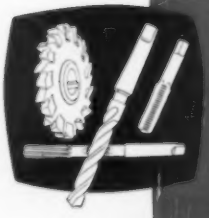
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

*Fellows* *Gear Production Equipment*

# GUTS

## that's what business



MORSE
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"THE MOST"
*in Cutting Tools*

# NOT CUTS

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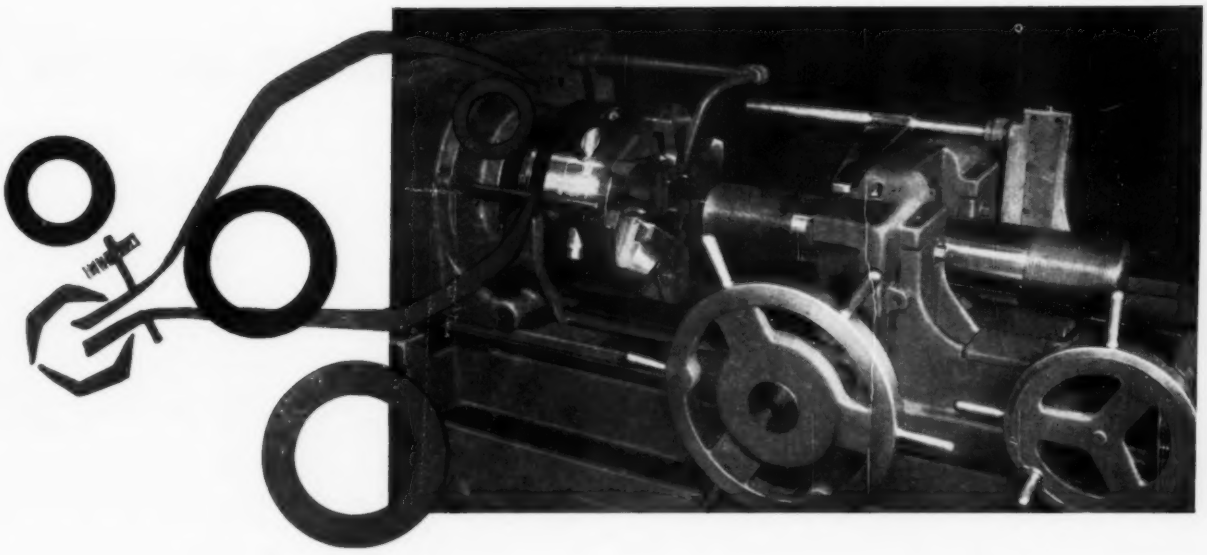
# heavy duty machine

## ....precision threading

## of large diameters



The cutting of large diameter threads to .003″ tolerance at the Kilbourn Engineering Co., Milwaukee, Wisconsin is an example of the heavy duty threading possible with the 48C LANDMACO Machine.

4140 steel heat-treated to 280-320 Brinnel is used in the production of 33½″ long double end studs used in high pressure vessels. 5¼″ 8 pitch U.N. threads are cut on both ends at 15-20 SFM by a 6″ 48C Single Spindle LANDMACO Machine equipped with lead screw feed, automatic workstop, and a six-chaser 48R LANCO Heat Treated Die Head. The stud end has an 8″ thread length threaded to a pitch diameter tolerance of .003″. The nut end has a 6″ thread length threaded to a Class 2 fit.

This operation is an example of the ease with which LANDIS equipment can solve your most difficult threading problem. The heavy duty construction of both the machine and the die head plus the lead screw feed ensures threading to precision tolerances.

Futhermore, the LANDMACO Machine is equipped with hammer blow handwheel carriage fronts as standard equipment. This reduces operator fatigue, always a consideration when producing heavy, large diameter workpieces. Automatic work stops (as used in this operation) are available as auxiliary equipment to position the work for correct thread length and reduce pre-threading handling time. Available in double or single spindle models their ranges are: 2½″ to 6⅝″ bolt, and 2½″ to 6″ pipe. For more information ask for Bulletin H-45-2.

Perhaps there are threading operations in your plant that could be achieved at lower cost, with better quality thread, or greater versatility of production. LANDIS has had over 50 years' experience solving every type of threading problem. May we help with yours?

**LANDIS *Machine* COMPANY**

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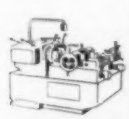
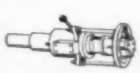
THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT

508C

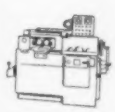

Threading Machines

Die Heads—Rotary & Stationary


Taps—Collapsible & Solid Adjustable

Centerless Thread Grinding Machines

Thread Rolling Tools


Thread Rolling Machines

# Save on first cost: One compact grinder multi-purpose versatility

*Landis 12" x 28" Universal and Tool Grinder*
*22 optional accessories extend range of grinding operations*

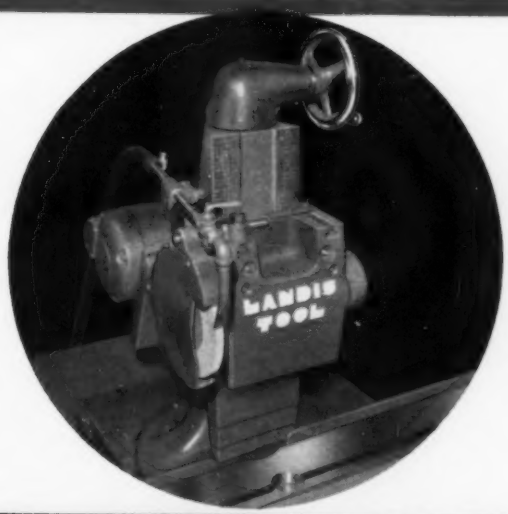
**LANDIS**
**precision grinders**

LANDIS TOOL COMPANY
WAYNESBORO, PENNSYLVANIA

# for toolroom precision and

**features that assure fast setups, precision results**

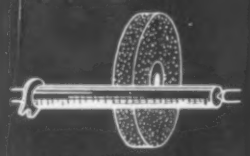
**Continuously variable speed** headstock drive permits adjustment for the best work speed without shifting belts. Only two revolving parts.



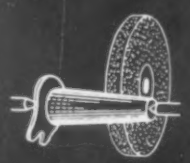

**Rigid wheel head mounting** on massive column adds stability for accuracy and fine finishes. Vertical ways for wheel height movement protected by telescoping covers below wheel head.

**Tool sharpening . . .** a wide variety of tools and cutters can be sharpened with standard and extra equipment.

**grinding operations with standard equipment**

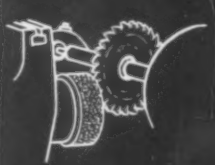


cylindrical

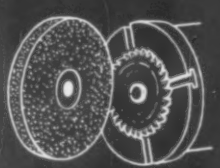


taper

surface



tooth sharpening

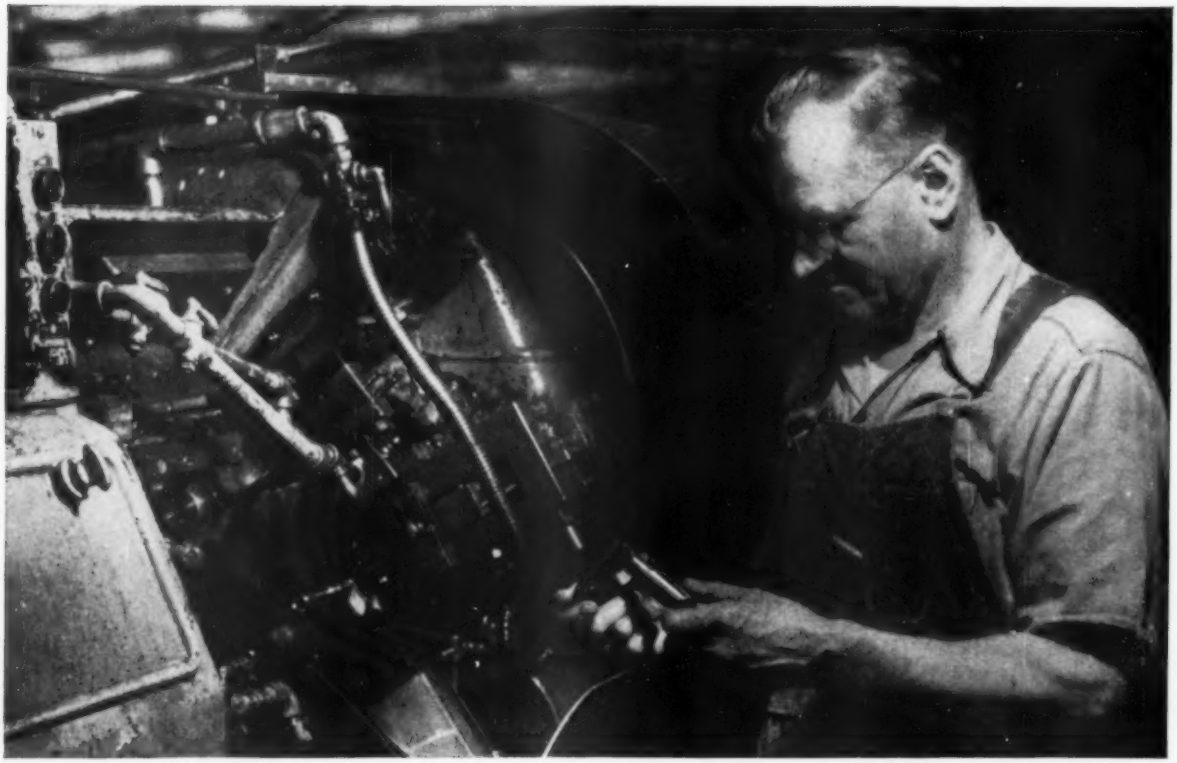


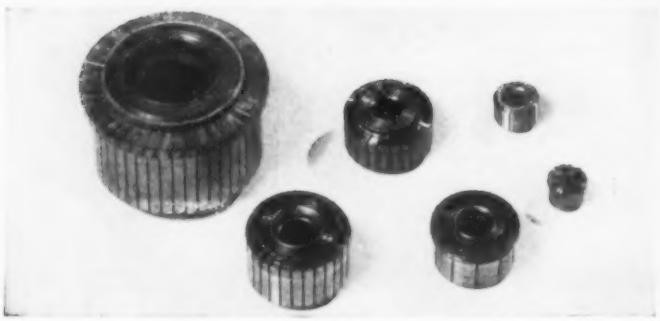
face

spiral mill

CIRCLE 211 READER SERVICE CARD

# IF YOU MACHINE STAINLESS STEEL





**REPUBLIC COLD DRAWN LEADED ALLOY STEELS** have helped Han-Kor Inc. of Cleveland, Ohio realize significant tool savings in mass producing electric motor commutators such as those shown above. Because each commutator is simply pressed onto its motor shaft, the center hole in the steel hub must be virtually perfect. Pull broaches used for this operation lasted for only 25,000 pieces when ordinary steel was used. Several years ago Han-kor switched to leaded steel and, since that time, no broaches have required replacement. Republic Cold Drawn Leaded Alloy and Carbon Steels may provide savings in time and money in your operations. Send coupon for more information.

**REPUBLIC WEDGE-LOCK STEEL SHELVING** is the world's strongest. And it actually gains strength as weight increases. Wedge-Lock is specifically designed for high stacking of such heavy items as dies and tools. It provides maximum loading in minimum floor space. There's no sagging, swaying or buckling. It can be assembled quickly and easily and is completely flexible to meet changing requirements. A shelving expert will help you plan your shelving arrangement

# REPUBLIC

REPUBLIC STEEL

*World's Widest Range of Standard Steels*

**PARTS . . .**

# You'll Want Republic's FREE BOOK

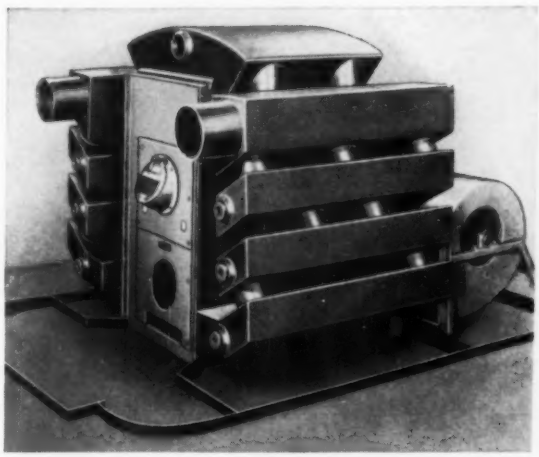
Do you know what causes tools to heat and burn, chatter marks, tapped holes to vary in size, rough threads, tooth breakage, burnished surfaces? Or what feed and speed to use when twist drilling .250 holes in A.I.S.I. 430-F?

The answers to these and many other questions are contained in Republic's *free book,* "How To Machine ENDURO Stainless Steel Bars".

This 96-page, pocket-sized manual is planned to help you obtain the best possible results when machining ENDURO bars. One section contains precise, accurate information on the basic principles of machining and how to correct troubles. Another section explains types and properties of stainless. Forty-two pages are devoted to estimating-tables covering conversion of fractional inches to decimals and millimeters, stock required for 1000 pieces, r.p.m. of spindles at given surface speeds, etc.

If you machine stainless steel parts you'll like this book. You will also like Free-Machining ENDURO® Bars. Here is a metal unsurpassed in high physical and chemical properties to which has been added the advantages of cold drawing: accuracy of section, close tolerance, uniform soundness and a fine surface finish. Two grades, A.I.S.I. Types 416 and 430-F are fully 90% as machinable as Bessemer screw stock. Republic also supplies ENDURO in hot rolled bars, special sections and wire.

Our metallurgists and machining specialists will give you expert, obligation-free assistance on application, processing and use. Just send the coupon if you would like one to call, or for your copy of, "How To Machine ENDURO Stainless Steel Bars".



**REPUBLIC ELECTRUNITE® MECHANICAL TUBING** provides safe, gas-tight joints required by the down-flow construction of this year-round furnace and air-conditioning unit. Uniform diameter, wall thickness, concentricity, strength, and ductility of ELECTRUNITE simplify design and help speed output of superior parts. Quality control from ore to finished tubing assures long, trouble-free service. Available in carbon and stainless steels.

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☐ Send____ copies of, "How To Machine ENDURO Bars".
☐ Have a machining specialist call.

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☐ Wedge-Lock Steel Shelving
☐ Cold Finished Leaded Steels

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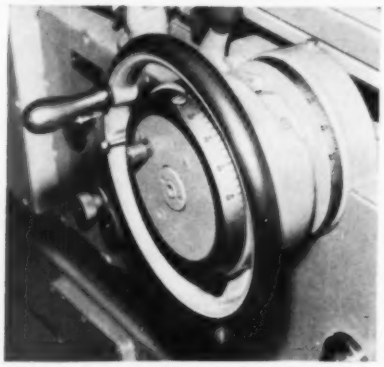
# STEEL

*and Steel Products*

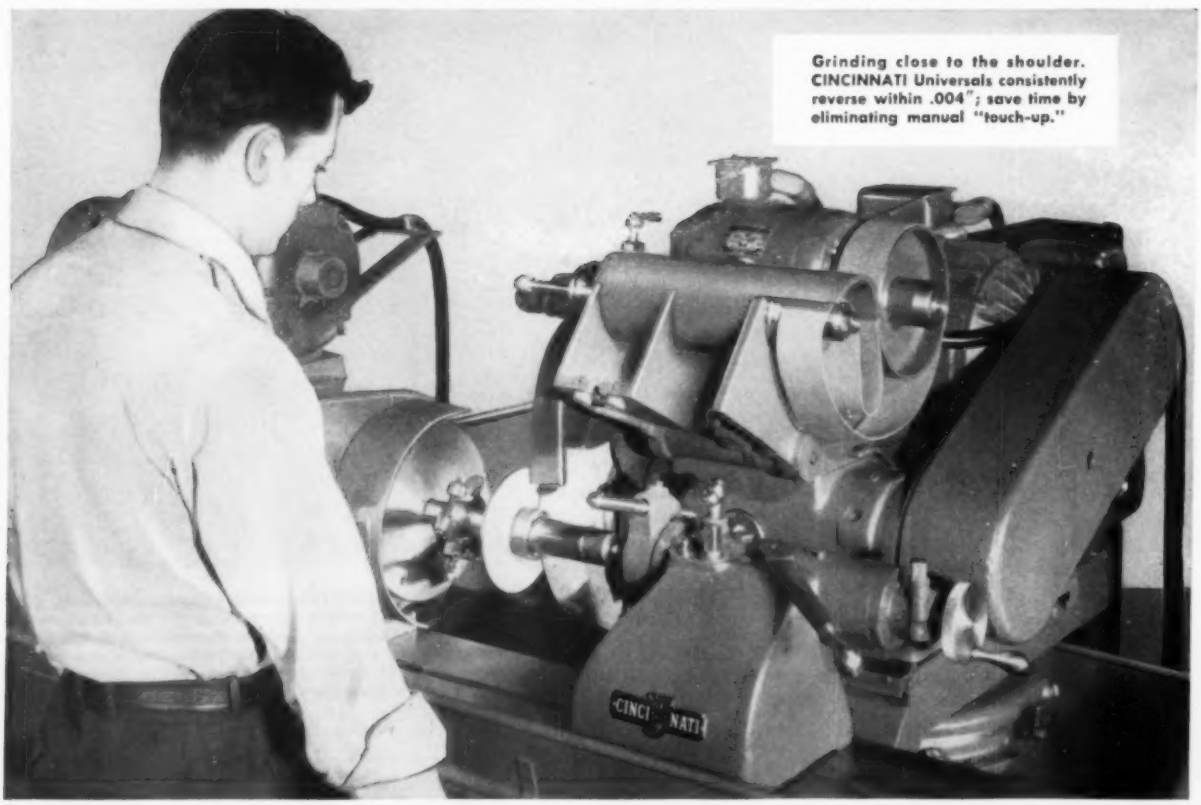
# These Cincinnati

## keep your setup

**FILMATIC Self-adjusting**
grinding wheel spindle bearings



**Two-speed**
cross traverse handwheel



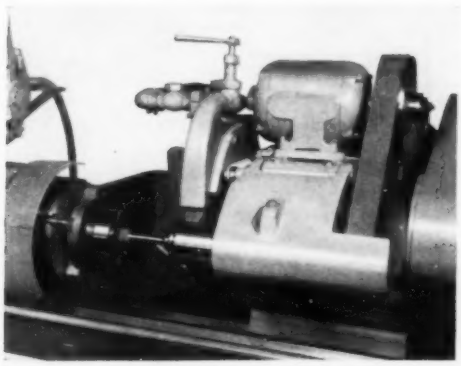
Grinding close to the shoulder. CINCINNATI Universals consistently reverse within .004"; save time by eliminating manual "touch-up."

**CINCINNATI®**

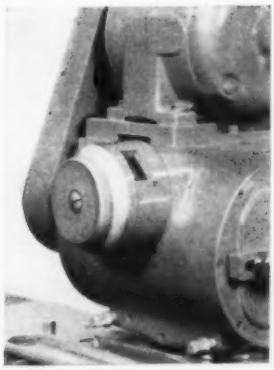
CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING
ROLL GRINDING MACHINES • SURFACE GRINDING MACHINES •

# timesavers

## from showing on the cost record



**Hinge mounted**
internal grinding unit



**Dial selection**
of headstock spindle speeds

Small manufacturing quantities may be good for inventory accounting, but they're tough on costs. In precision toolroom grinding, CINCINNATI FILMATIC Universals offer several ways to eliminate or greatly reduce the setup element of cost.

**FILMATIC grinding wheel spindle bearings** require no adjustment for any job assigned to the machine.

**Two-speed cross feed mechanism** facilitates quick positioning of wheelhead for multiple diameter grinding; incorporates pickfeed all the way to final size.

**Internal grinding unit** is hinged at the front of the wheelhead casting, always ready for internal work.

**Instant work speed selection** for the diameter being ground. Just turn the dial with one hand, that's all there is to it.

**Power rapid positioning** of wheelhead. Saves time and energy, especially when setting up for widely varying diameters (extra equipment).

Other ways in which CINCINNATI FILMATIC 12", 14", 18" Universal Grinders can reduce costs in your shop are outlined in catalog No. G-663-1. May we send a copy to you? You will find brief specifications in Sweet's.

**Power positioning**
of wheelhead

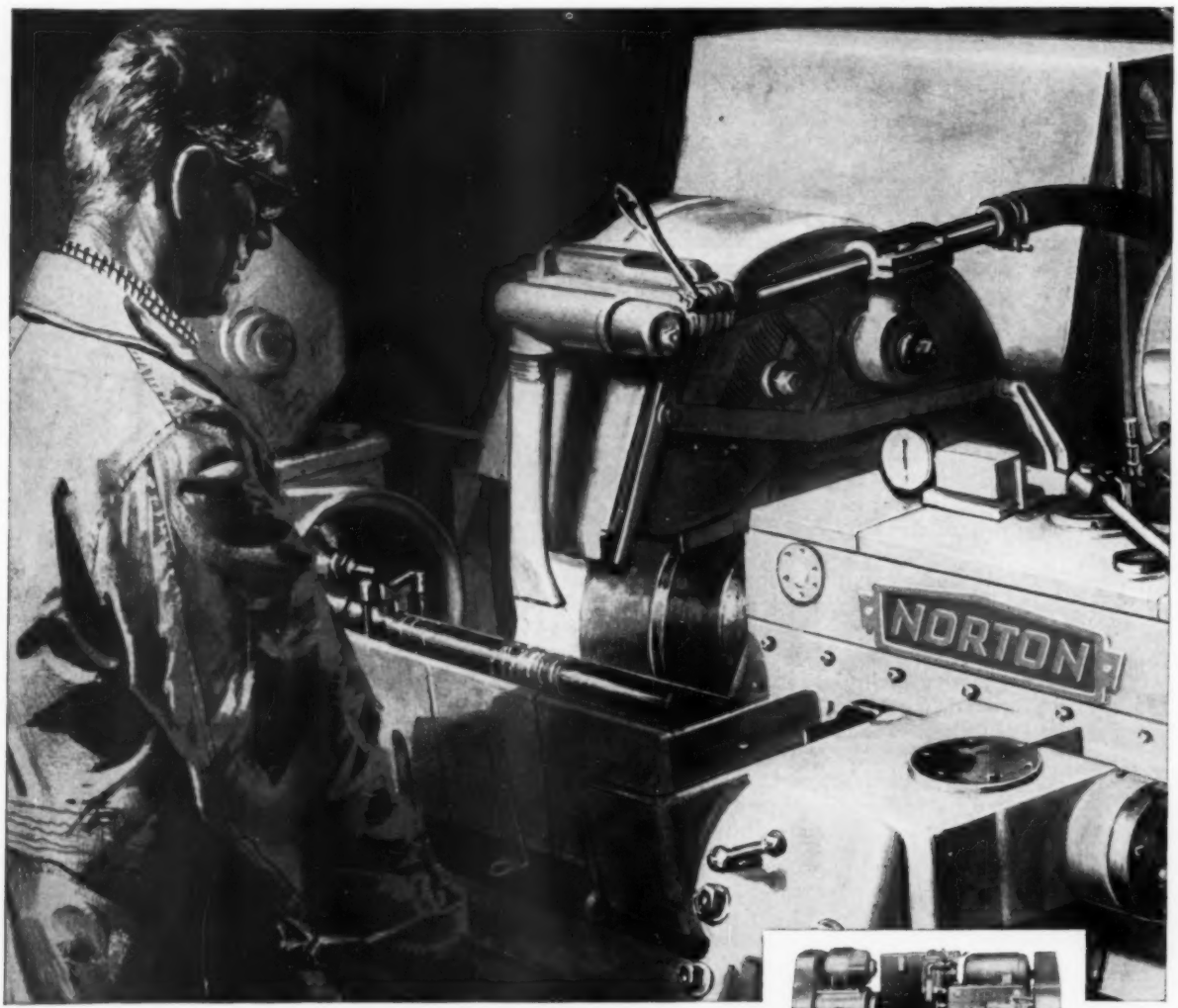
MACHINES • MICRO-CENTRIC GRINDING MACHINES
CHUCKING GRINDERS • CENTERLESS LAPPING MACHINES

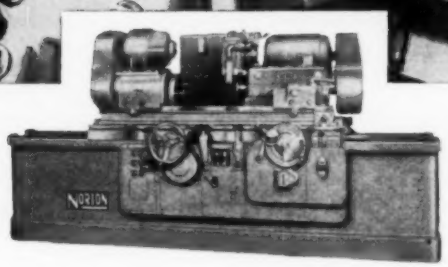
*Grinding Machine Division*
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

# Norton Type CTU Cylindrical Grinders knock out production lags . . . to give you

bigger grinding profits

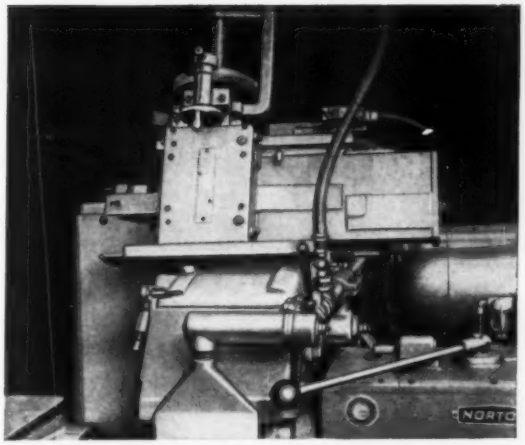
Standard Norton Type CTU Semiautomatic Grinders in 4" to 14" swings have the features you need to raise your profits. Automatic accessories for wheel truing, work loading and many other functions are available to further reduce manual effort and operator attention.



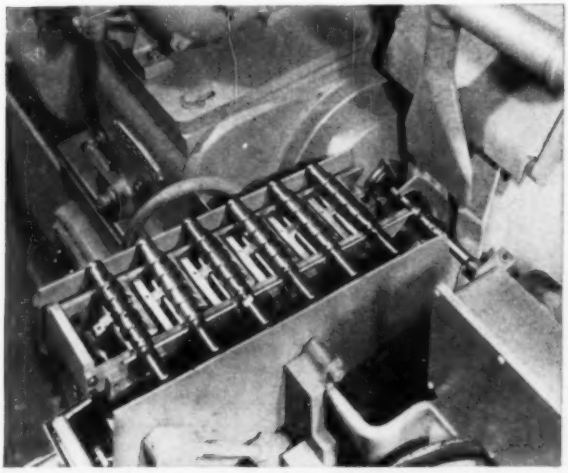



**This 10" Norton machine** is one of the CTU family of general purpose and semiautomatic precision cylindrical grinders — top performers in anybody's book. They lick production lag with a unique combination of speed, accuracy, flexibility and durability. Production line and job shop users report that Norton CTU's have doubled production, replaced several machines, eliminated extra operations. Write for Catalogs 531, 1488 and 1787.

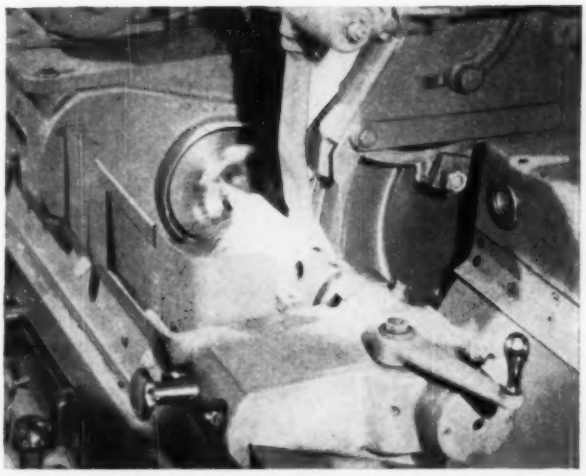
# *These accessories boost your profits... give you the "Touch of Gold"*



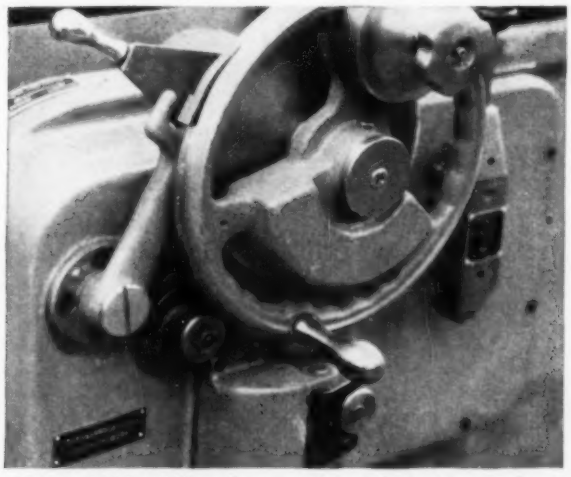
**Automatic Truing** knocks out time delay of manual operation. Abrasive and diamond savings provide an added "Touch of Gold."



**Fast Automatic Loading and Unloading** through precise mechanical means. You rule out production lags from worker's fatigue and enable your operators to attend more than one machine.



**Automatic Wheel Contact Accelerator** reduces over-all cycle time and speeds production. You never "grind air" because wheel head movement adjusts to grinding rate only after the grinding wheel touches the work.



**Automatic Wheel Wear Compensator** eliminates interrupted production. It compensates for reduced wheel diameter by resetting the wheel head at each truing — whether or not operator is present.

Norton CTU Grinders and Accessories are sound investments for increased profits. They can raise your production by 100%. Remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

*To Economize, Modernize with* **NEW**

**NORTON**

**GRINDERS and LAPPERS**

**Making better products . . . to make your products better**

**NORTON PRODUCTS** Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — **BEHR-MANNING DIVISION** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

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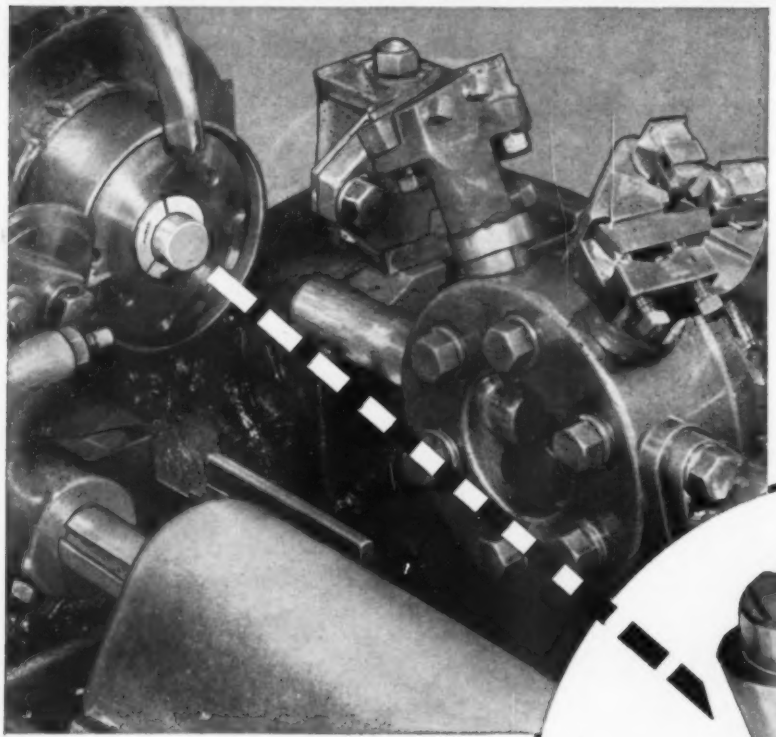
ELMIRA, N.Y.

# PRECISION PRODUCTS
for BROWN & SHARPE machines



## COLLETS
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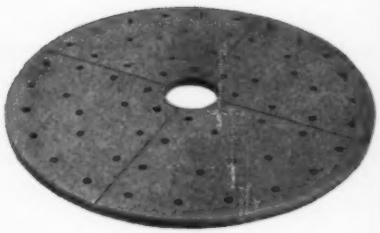
CIRCLE 218 READER SERVICE CARD

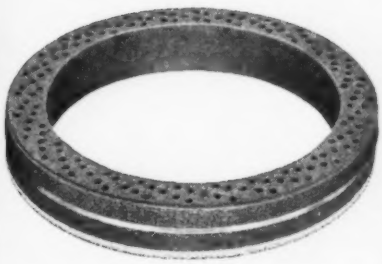
CIRCLE 219 READER SERVICE CARD ►

# Wide variety of Gardner abrasives assures top performance in all surfacing operations



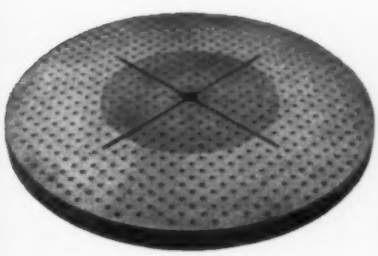
**Segmental Wire-Lokt® discs** for large horizontal grinders

**Smooth faced Wire-Lokt discs** for general purpose grinding



**Narrow face disc** with corrugations for cool cutting

**Cylinder wheels** for use on most popular types of vertical spindle grinders



**Combination grade and face** with radial lines for even wear and better coolant distribution

**Cylinder wheels** with square centers for fast stock removal on large areas

**range of disc sizes**

| | diameter | thickness |
|---|---|---|
| regular disc | 10″ to 48″ | 1″ to 3″ |
| segmental disc | 53″ to 84″ | 1″ to 3″ |
| cylinder wheel | 11″ to 32″ | 4″ or 5″ |
| square center cylinder wheel | 18″ & 20″ | 4″ or 5″ |

*For a review of your flat surface grinding operations, call your Gardner Abrasives Specialist today.*

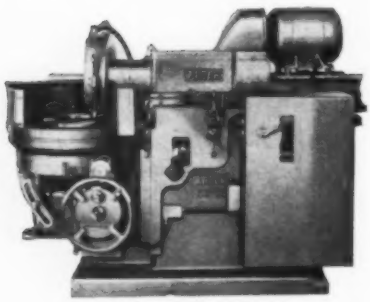
**GARDNER**

abrasive discs

BELOIT, WISCONSIN

# Announcing the SUNDSTRAND-ARTER Grinder Division

**MODEL E HYDRAULIC** vertical column rotary surface grinder has reciprocating table and rotating magnetic chuck with 12" and 16" capacities.



**ROTARY SURFACE GRINDER, Model B,** is available in four chuck sizes: 20", 24", 30", and 40". Hydraulic motor provides stepless variable speeds to tiltable work table.

Newest additions to the growing line of Sundstrand machine tools are rotary surface grinders, cylindrical grinders, and Jigmatic electronic tape-controlled positioning table — all products of the Sundstrand-Arter Grinding Division. These products — already enjoying an industry-wide reputation for quality and precision — now have the additional backing of Sundstrand facilities and resources.

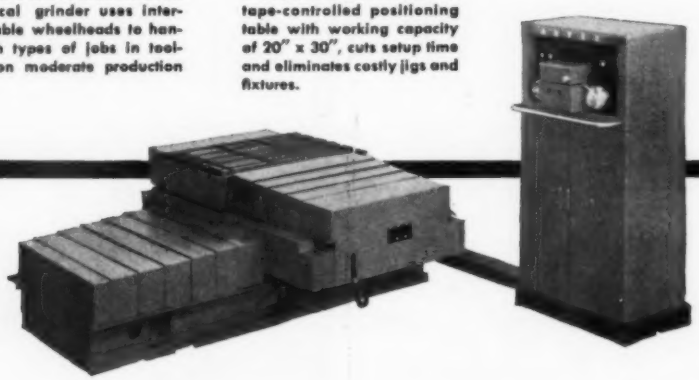
The same awareness of industry's production needs, interpretation by skilled machine designers, and adherence to the highest standards of manufacturing accuracy that have always distinguished Sundstrand machine tools will be applied to products of the Sundstrand-Arter Grinding Division.

On these pages are shown four examples of Sundstrand-Arter equipment, as well as representative types of milling, turning, broaching, and special machines built by Sundstrand.

Not shown, but equally important to you, is Sundstrand "Engineered Production" — the application of years of design and manufacturing engineering skill to your specific needs. It's another plus you get from Sundstrand to assure maximum machine productivity at minimum cost per piece.

**DUAL-PURPOSE** internal-external cylindrical grinder uses interchangeable wheelheads to handle both types of jobs in toolrooms on moderate production runs.

**JIGMATIC ELECTRONIC** tape-controlled positioning table with working capacity of 20" x 30", cuts setup time and eliminates costly jigs and fixtures.



SUNDSTRAND

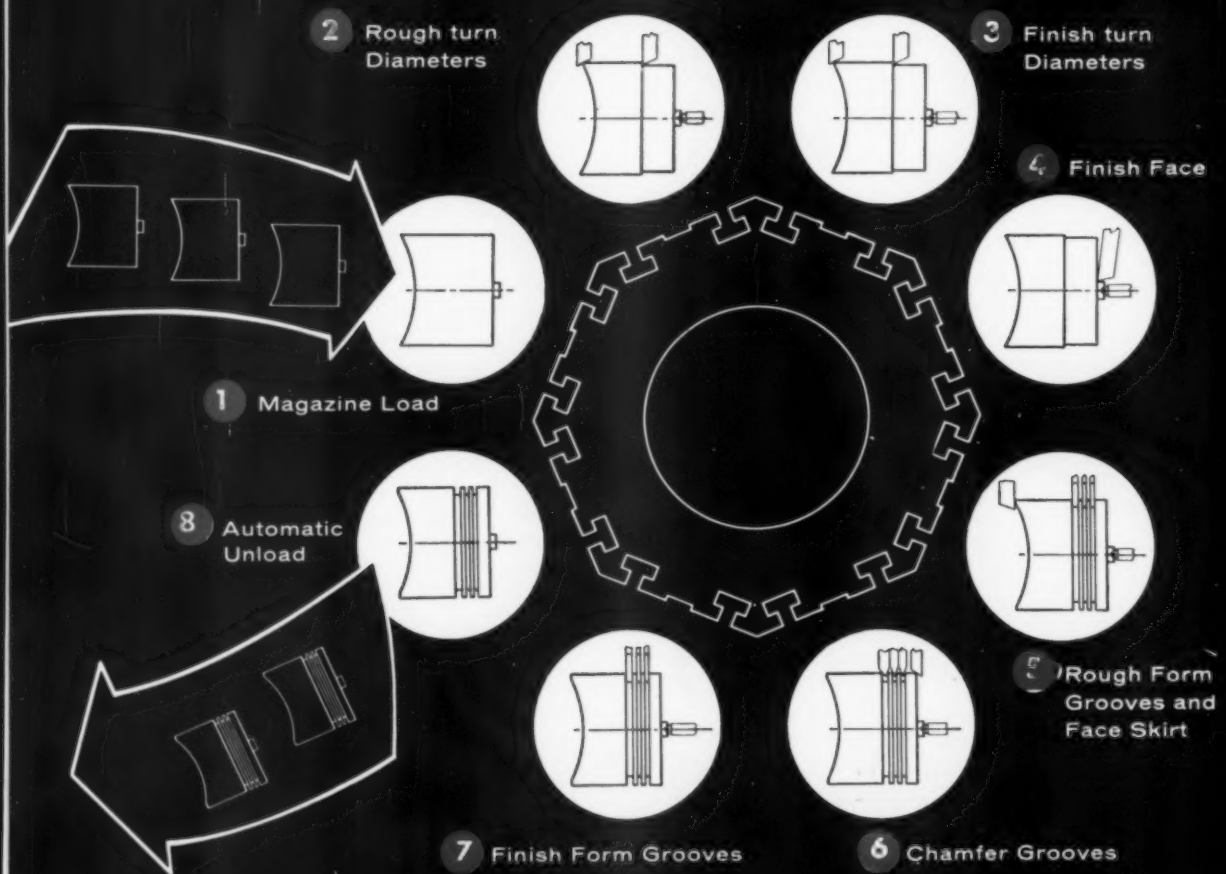
**SUNDSTRAND MACHINE TOOL CO.**

2533 ELEVENTH STREET • ROCKFORD, ILLINOIS

here is

# circumferential automation

at work . . .




*Here's an example of Circumferential Automation integrated into an automated production line. Castings are conveyed to the magazine which loads the machine. After machining (16 operations in 8 seconds) is completed the piston is automatically unloaded—carried on to assembly.*

...Automatic Load—Unload Accessories INTEGRATE

# circumferential automation*

## and in-line automation

* Each spindle of an Acme-Gridley Automatic is a work station where a number of machining operations can be performed. From the time the work piece is loaded into the spindle it is never let go; indexes from station to station where pre-sequenced operations are carried on without manual attention. Upon completion workpiece is released at the unloading position and is subsequently transferred to the line. Secondary operations are eliminated. This is automation . . . circumferential automation.

Acme-Gridley automatics equipped with magazine loading and unloading devices can easily be integrated into fully automated production and assembly lines. They provide maximum production flexibility and assure day-in, day-out operation with minimum human attention.

Let us show you how circumferential automation can go to work for you.—our representative will be glad to call without obligation.

# National Acme

THE NATIONAL ACME COMPANY, 171 E. 131ST ST., CLEVELAND 8, OHIO • Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

All 'round the world where there's work to be done
and time to be saved there's an Acme-Gridley to do it.

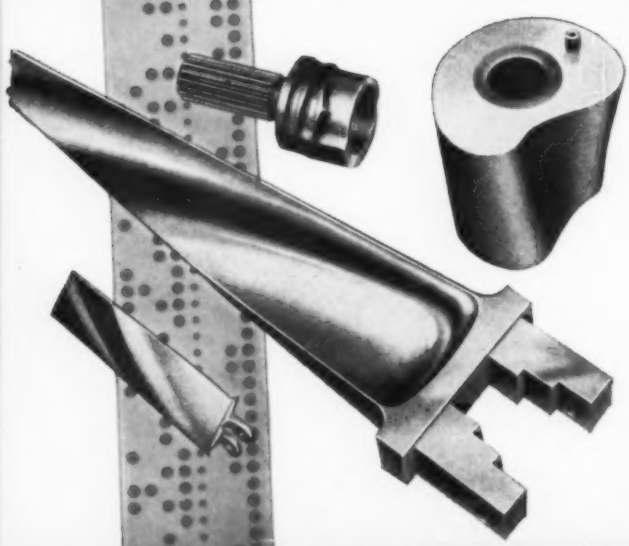
Now—a machine which can realize the full potential of tape control!

# FIRST

FIRST to provide 360° work rotation for 3-dimensional machining of complex parts

FIRST to combine grinding, dressing, and dressing compensation with milling

## NUMERI-TROL



Numeri-Trol slashes lead time, tooling cost and machining time of intricate, three-dimensional prototypes and precision parts. Rotary feed of the work, plus lateral motion of the work head and transverse motion of the cross slide permit milling and finish grinding of parts too complex to be economically produced by conventional methods. Grinding wheel dressing and dressing compensation are fully tape-controlled. In addition to grinding, three-dimensional machining with Numeri-Trol includes conventional rotary milling and longitudinal milling with automatic work feed and 360° indexing.

Design flexibility of Numeri-Trol permits the use of either magnetic tape or punched tape numerical control systems for machining directions.
XLO
EXCELL-O
NUMERI TROL

# TAPE CONTROLLED PRECISION PROFILING MACHINES BY EX-CELL-O

Precision-made to heavy-duty production standards, Numeri-Trol sharply reduces machining time and eliminates human error in the production of irregularly-shaped parts. Created especially to take advantage of the accuracy and design possibilities made available by high-performance numerical control systems, Numeri-Trol does away with the need for cams, templates and models; on many once-difficult jobs, it practically eliminates tooling and costly fixtures. Write direct, or ask your Ex-Cell-O Representative how easy it is to "tape" your toughest part and produce it on Numeri-Trol.

XLO EX-CELL-O FOR PRECISION

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

*Machinery Division*

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • TORQUE ACTUATORS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

58-50

CIRCLE 225 READER SERVICE CARD

# Precision Bores Nine Different Planetary Drive Housings

This new Cross dial machine bores the planet pinion holes in planetary drive housings. Production of parts with three pinions is seven per hour and with four pinions five per hour at 100% efficiency. Changeover from one part to the other can be accomplished quickly and easily.

Housings are manually loaded into the fixture in the center of the index table. The automatic cycle begins when the cutter head moves horizontally to bring the first spindle into position to rough bore the pin holes. Spacing is established by the index table, which positions the part for boring one hole at a time. The cutter head then indexes the second spindle into position and the holes are semi-finish bored. Finally, the third spindle indexes into position for finish boring. After all cuts are completed on each hole, the head moves horizontally away from the work piece to complete the automatic cycle.

Roughing and semi-finishing operations are performed with multiple blade cutters, while the precision finishing operation is accomplished with a single point tool.

Other features include: complete interchangeability of all standard and special parts, construction to JIC Standards, hardened and ground ways, hydraulic feed and rapid traverse, and automatic lubrication.

*Established 1898*

THE CROSS CO.

*First in Automation*

PARK GROVE STATION • DETROIT 5, MICHIGAN

Another Special by Cross
CROSS
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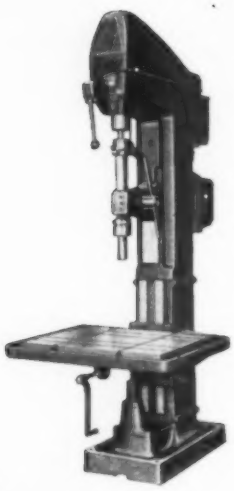
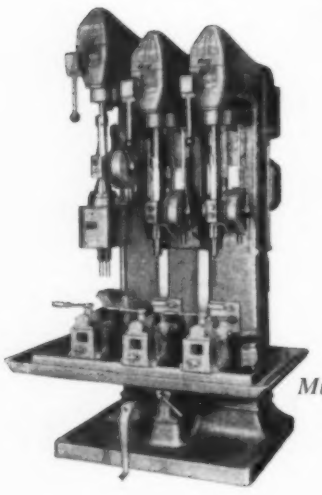
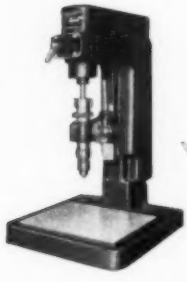


*Column type*

# Avey has the right one

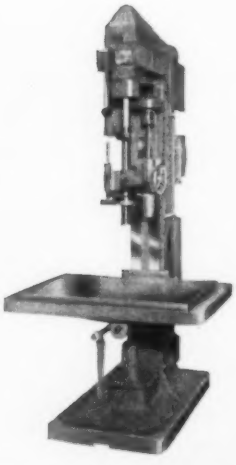


*Multi-spindle*



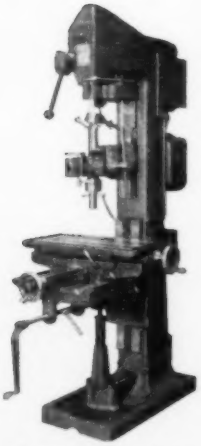
*Bench type*

*Super 8-spindle*



*Automatic cycle machine*

*Round table*



*Compound table*

**standard machines**

The profit-making features of our standard drilling and tapping machines can be combined in more than 100,000 different ways. One of those combinations exactly meets your requirements, and you can get it quickly.

Capacities in cast iron from very small numbered drills to 2″; No. 32 Jacobs chuck to No. 4 Morse taper.

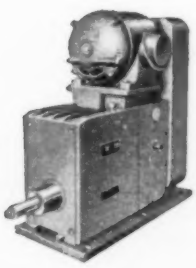
Six or 8 speeds up to 12,000 rpm; 4 feeds. Column or bench type, with wide range of swing; 1 to 8 spindles.

Available features include micrometer stop collar, telescoping spindle guard, dynamically-balanced rotating parts, rack-and-pinion-operated motor plate, rugged involute spindle construction, and automatic cycling.

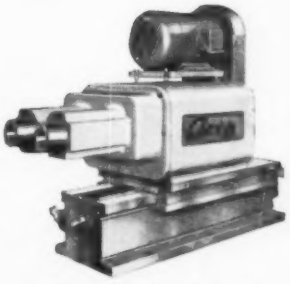
Tool Room machines are available with No. 2, 3, or 4 Morse taper. You pick the table you need: large (34″ x 25″), round (18″ diameter), or compound (25″ x 12″).

# for Avey makes them all

Avey

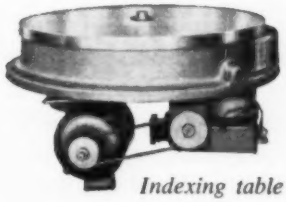


*Cam feed unit*

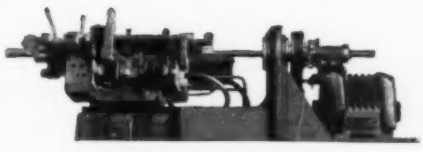


*Precision boring unit*

*Type A unit*



*Indexing table*



*Avey-draulic feed unit*

**production machines**

You can increase your profits on unit costs, floor space, machine-handling time, and operating time with our high-production machines, built of standardized modular units:

Automatic cam feed units for drilling, tapping, reaming, hollow milling. No. 1, 2, or 3 Morse taper. Mount at any angle. Fully or semi-automatic.

Avey-draulic feed unit. Automatic withdrawal for chip removal only when necessary during deep hole drilling. Rapid advance, feed, rapid return. Strokes 12″ to 30″.

Precision boring unit. 5-20 hp; 12,000 lb. maximum thrust; non-metallic ways. Positive depth control; adjustable feeds.

Type A unit. High-speed ball-bearing drilling unit for variety of applications. Capacity in cast iron: 3/16″ or 3/8″. Spindle speeds: 1200 to 3600 rpm.

Automatic index tables. Rapid, accurate indexing to .001″; 16″ to 80″ diameter.

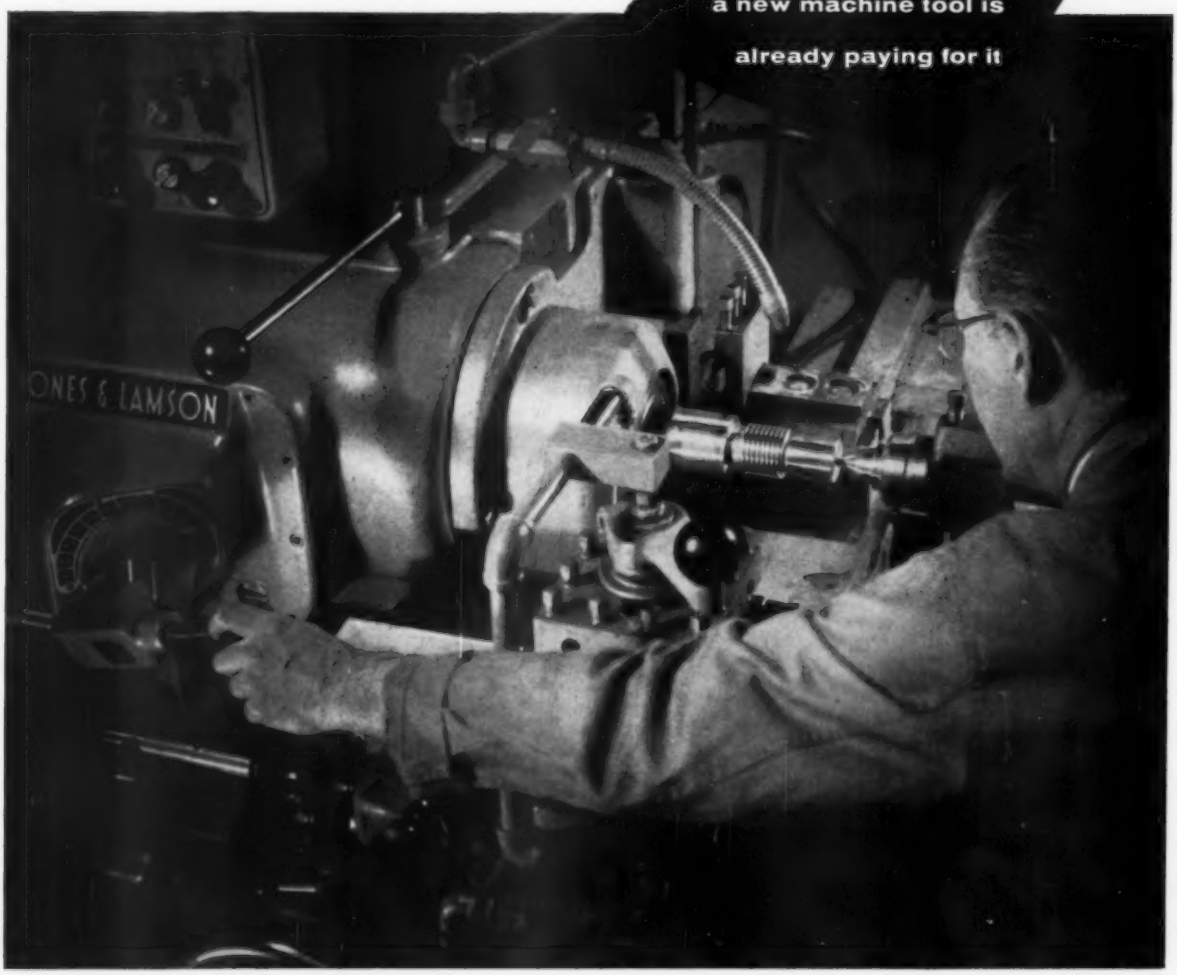
These units can be mounted on standard steel bases and columns for either linear or rotary operations.

Avey Division, The Motch & Merryweather Machinery Company, Box 625, Cincinnati 1, Ohio.

**drilling, tapping, production machines**

# JONES & LAMSON MACHINE TOOLS

the man who needs a new machine tool is already paying for it




## The Turret Lathe with a fully automatic thread-chasing cycle!

Here is full turret lathe versatility and a threading attachment with a fully automatic cycle — all in one machine. Now you can be sure of concentricity of threading with other lathe work, *all done in one chucking*, with the time saving of the Auto-Threader!

This Auto-Threader will chase straight or taper threads — or a combination — internal or external, from the front of the machine.

Other features include: uniform thread length, by means of positive stop and follower nut disengagement together with rapid tool withdrawal; precision lead control by full depth follower nut engagement on a hardened and ground leader.

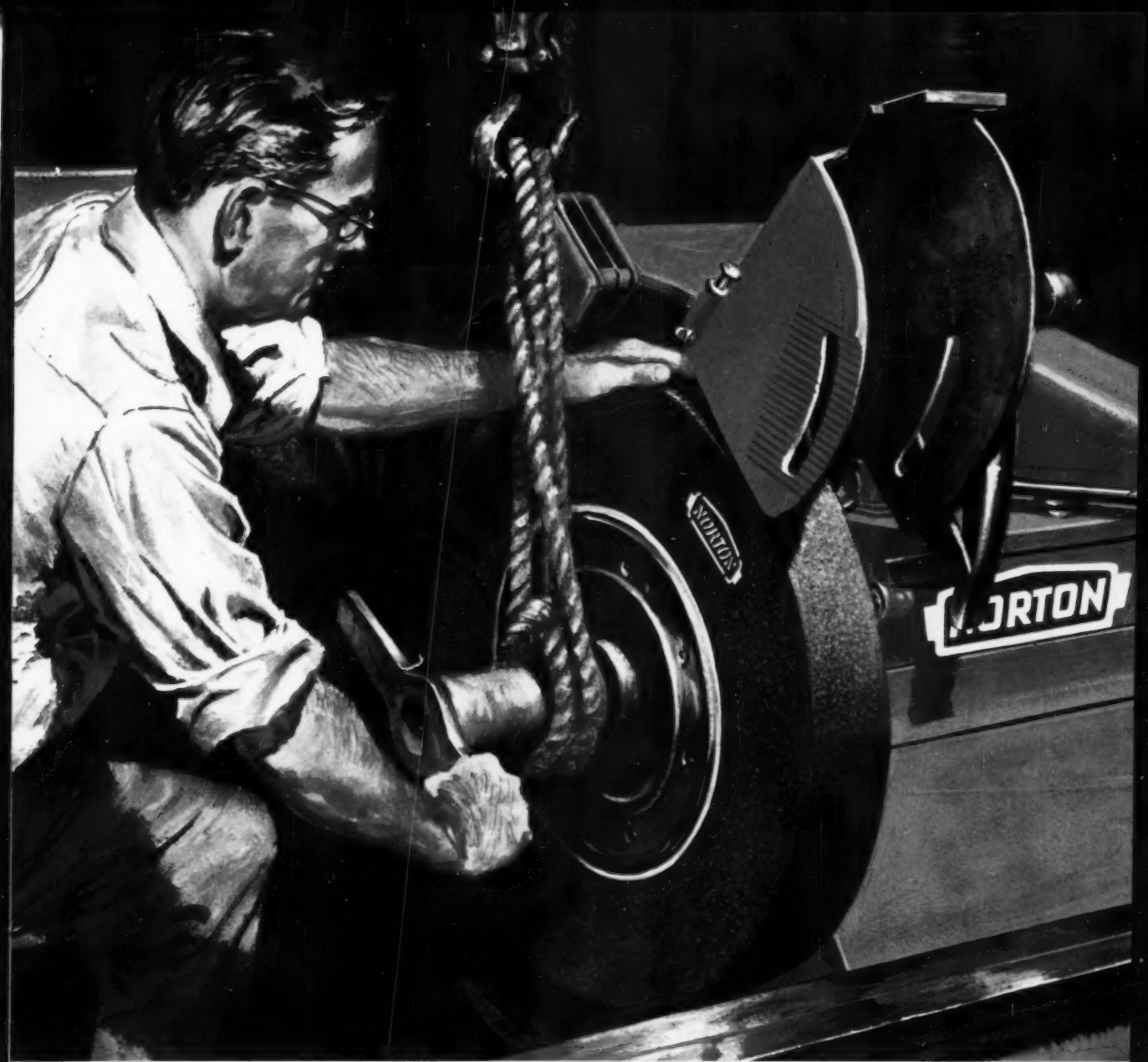
Write for descriptive folder No. 5440. Jones & Lamson Machine Company, 502 Clinton Street, Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Precision Boring Machines • Thread & Form Grinders • Optical Comparators • Thread Tools



CIRCLE 230 READER SERVICE CARD

CIRCLE 231 READER SERVICE CARD ►




# He's equipping this machine with the "Touch of Gold"

Grinding is always a profit-producing step in metal working. That's why the grinding wheel itself is so important — and why Norton world leadership in grinding is important to you when you specify grinding wheels.

Because a Norton wheel, contacting the work in process, is always adding the "Touch of Gold" . . . creating value and usefulness through improving the fit and finish of the product. The right wheel for each job is the key to having each job done right . . . which is the real secret of profitable production. And Norton stocks more than 200,000 types and sizes of grinding wheels to make your "Touch of Gold" quickly available. Plants and distributors all around the world.

NORTON COMPANY, General Offices, Worcester 6, Massachusetts.

NORTON
ABRASIVES

Making better products . . . to make your products better

# New ARMSTRONG

## *Armide* CARBIDE INSERT TOOL HOLDERS

**STYLE TR**
**(opposite Hand TL)**
Holds Triangular 6-edge, Armide and other carbide "throw-away" inserts.

**STYLE SR**
**(opposite Hand SL)**
Holds square, 8-edge, Armide and other carbide "throw-away" inserts.

Buy **ARMSTRONG TOOLS** from your Industrial Distributor

*Write for catalog*

## Embody...Convenience, Economy Simplicity and Strength based on these superior features:

- **IMPROVED CLAMPING METHOD**—speeds indexing of Inserts.
- **REPLACEABLE SEAT** of Hardened Tool Steel—protects shank and provides flat base to prevent damage to inserts as they are clamped in position.
- **SHANK** of Heat Treated Alloy Steel—gives extra strength and rigidity.

A slight turn of a single screw permits rapid indexing of the ARMIDE insert—reducing down time to a minimum.

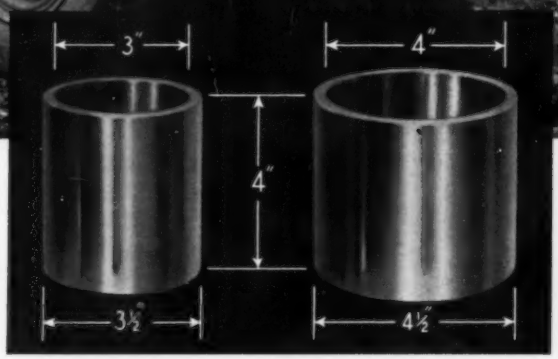
The use of ARMIDE "throw away" inserts provides the economy of multiedged inserts—triangular inserts have six, square inserts eight cutting edges. These are available in Utility or Precision finish and in three grades of ARMIDE: 350, 370 or 883.

Protection to the shank is given by the replaceable tool steel seat which prevents wear and damage to the shank and provides a flat base for the insert reducing the possibility of damage to the insert as it is clamped in place. A relief groove is ground into the seat providing clearance when a dulled insert with "built up" edges is turned over.

ARMSTRONG ARMIDE Carbide Insert Tool Holders are furnished in two styles and three sizes. Complete data on these tools is given in Bulletin CIT, mailed on request.

## ARMSTRONG BROS. TOOL CO.

**5215 W. ARMSTRONG AVENUE** **CHICAGO 46, ILL.**




# OILITE
## SELF-LUBRICATING BEARINGS
## prove a match for top payloads on ATHEY Rear Dump Trailers

Oilite* Bronze Bearings have proven more than a match for the 22 and 34-ton payloads on Athey Rear Dump Trailers.

Oil-cushioned against shocks and impacts, these Oilite heavy-duty bearings have demonstrated that they will withstand years of punishment and still give satisfactory service. They require only infrequent lubrication and help Athey substantially increase the dependability of its hauling units. Yet, Oilite Bearings *cost less* than many other type bearings!

No wonder more and more designers are specifying popular Oilite self-lubricating Bearings for motor vehicles, appliances, engines, power tools, machinery and countless other products.

Contact your local Oilite Engineer today. He'll gladly provide complete design information to help you make your bearing and bushing applications low-cost, dependable and maintenance-free. Look for him in your telephone directory under "Bearings—OILITE" or write direct to Dept. I-8.

**TYPICAL PROPERTIES OF SELF-LUBRICATING BRONZE OILITE BEARINGS †**

| | |
|---|---|
| Porosity, % | 18-23 |
| Ultimate Tensile Strength, (psi) | 18,000 |
| Compressive Strength (psi) | 20,000 |
| Elongation, % min. in 1″ | 10 |
| Brinell Hardness | 40 |

† Other materials and physical properties available.

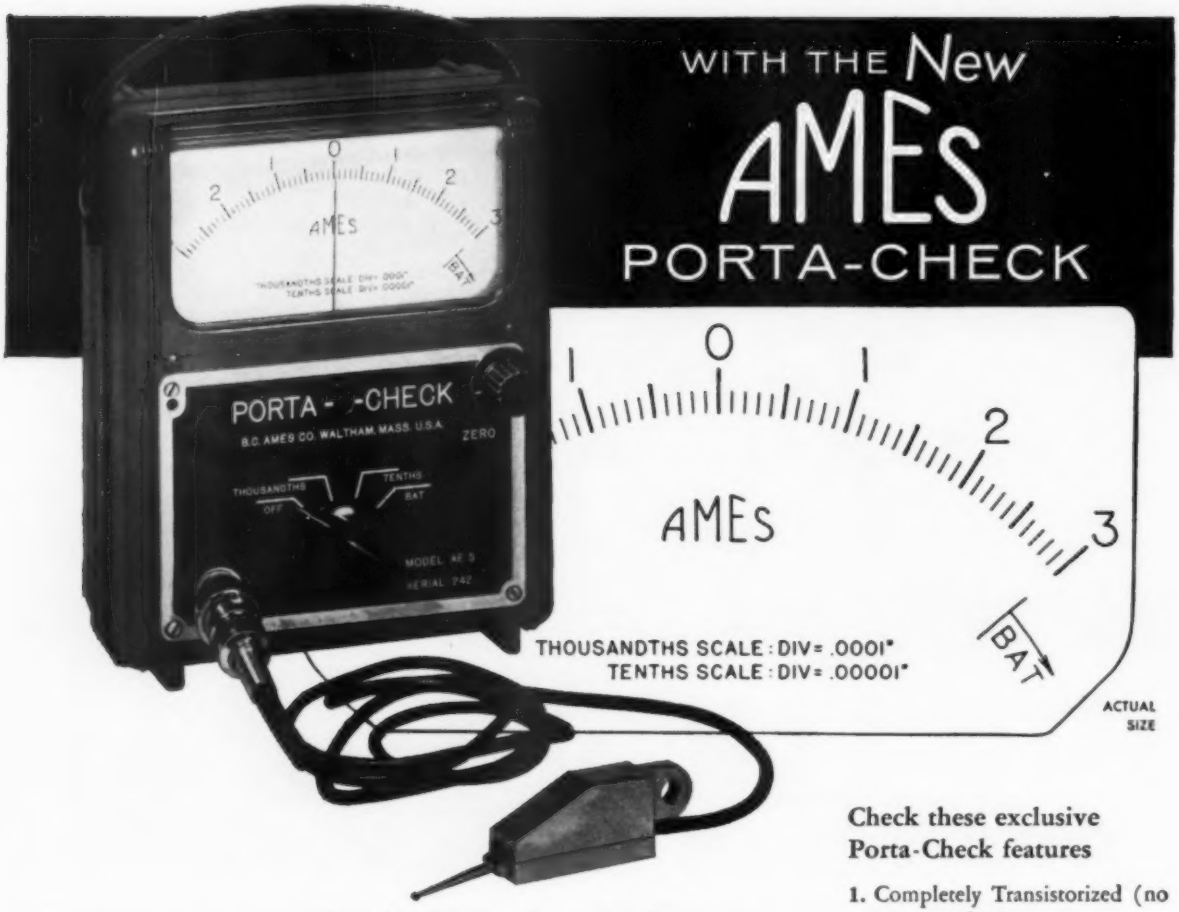
* REGISTERED TRADEMARK ONLY CHRYSLER MAKES OILITE

*the most trusted name in powder metallurgy*

SINCE 1939 — A CHRYSLER PRODUCT — OILITE

**AMPLEX DIVISION**
CHRYSLER CORPORATION, DETROIT 31, MICHIGAN
SELF-LUBRICATING BEARINGS • PRECISION PARTS • METAL FILTERS • FRICTION UNITS

# *Measure in Millionths*




***Now you can see ten millionths of an inch . . . Easily estimate five millionths . . . with Ames Portable Transistorized Comparator.***

An amazingly sensitive comparator, Ames Porta-Check now makes it possible to get accurate measurements—*in millionths of an inch*—anywhere in the plant. Use it on the production line; at quality control check points; in the tool room — wherever you need it!

Porta-Check converts minute dimensional variations to voltage changes and amplifies them so they can be read easily and accurately. The meter dial—shown in actual size—can be used as either a "tenths" scale or a "thousandths" scale by simply setting the front panel rotary switch.

As a "tenths" scale it is graduated directly to *ten millionths*. With the generous spacing between graduations it is easy to estimate *five millionths*. Total range on this scale is .0006".

As a "thousandths" scale it is graduated directly to .0001", making it simple to estimate "half tenths". Total range on this scale is .006".

The low friction pick-up head is unaffected by environmental conditions and uses no mechanical magnifications. In fact, the pick-up tip, which is the only moving part in the pick-up head is supported by a blade fulcrum bearing that is frictionless and free from bind, play or wear.

**Check these exclusive Porta-Check features**

1. Completely Transistorized (no vacuum tubes)
2. Low cost, long life batteries provide power
3. Lightweight, portable — use it anywhere in the plant
4. Accurate, Sensitive, Rugged
5. Simultaneous zero setting for both scales
6. Simultaneous magnification setting for both scales
7. Two scales: "Tenth" scale graduated to *ten millionths*

   "Thousandths" scale graduated to .0001"

The new Ames Porta-Check is truly the most accurate portable comparator available today — and it's low in cost! See your local Ames representative or write directly to the factory for complete details.

*Representatives in Principal Cities*

## B.C. AMES CO.

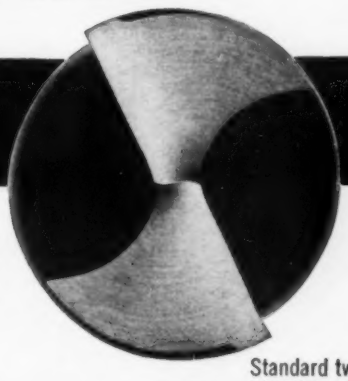
*26 Ames Street, Waltham 54, Mass.*

*In Canada—B. C. Ames Co., 45 Oriole Parkway, Toronto 7*

MANUFACTURERS OF MICROMETER DIAL INDICATORS AND GAUGES

# FIRST MAJOR DRILLING IMPROVEMENT IN 100 YEARS!

*. . . a Product of*
*CINCINNATI RESEARCH*



"Spiral point", Cincinnati's new concept in drill point geometry, provides cost-reducing opportunities in your drilling operations.

*Produces more precision holes per drill grind.*

*Produces rounder, straighter, on-size holes . . . frequently eliminates reaming.*

*Maintains hole-positioning accuracy with its self-centering drilling action . . . often eliminates pre-centering and costly guide fixtures.*

*Requires less thrust force with resulting greater drilling accuracy, less workpiece distortion.*

Standard twist drill with spiral point geometry.

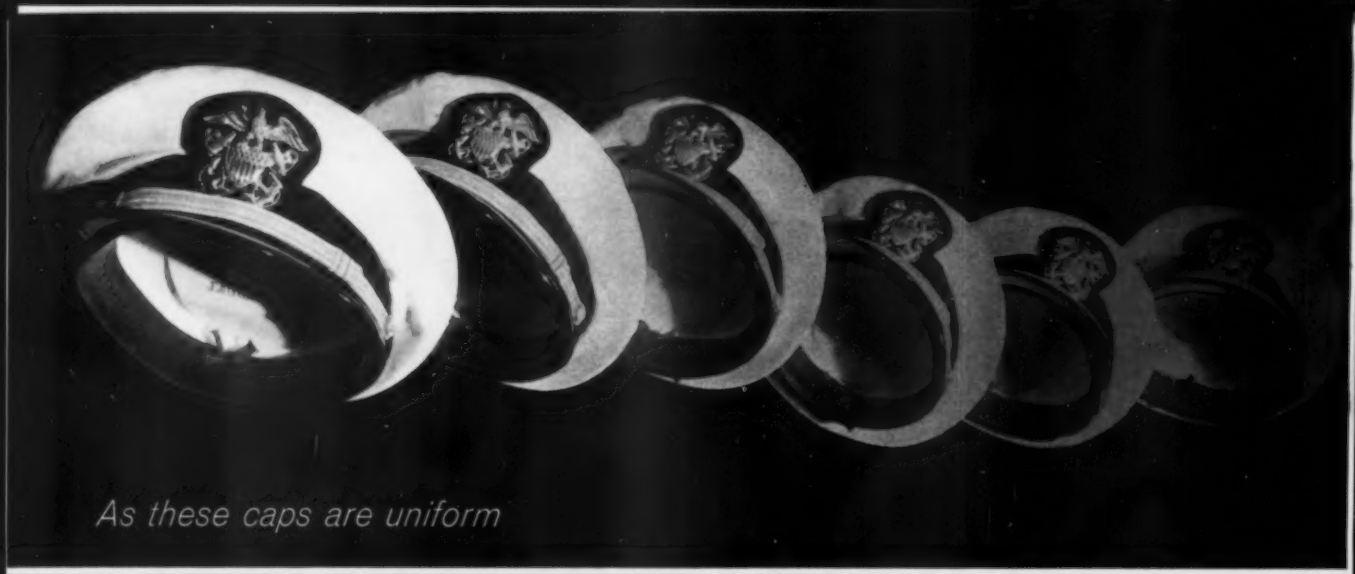
Put this cost-reducing spiral point geometry on the twist drills in your plant with the SPIROPOINT Drill Sharpener, another precision product of Cincinnati Research. Write today for technical bulletin.

Improved Machining Through Research

## CINCINNATI LATHE AND TOOL CO.

3206 Disney Street • Cincinnati 9, Ohio

*"TRAY-TOP" Lathes / "CINCINNATI" Drilling Machines / "SPIROPOINT" Drill Sharpeners*



*As these caps are uniform*

*...So Card taps and gages are uniform, too*

# *Your production's consistent ...because Card taps are uniform*

Your first step in consistent production performance is the cutting tool itself. Because Card taps are identical they keep production perfect — and predictable. Shopmen know all about the uniformity of Card taps. The gages are like that, too. S. W. Card Division, Mansfield, Mass. Card Warehouses: Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco.

The CARD Quality

# CARD

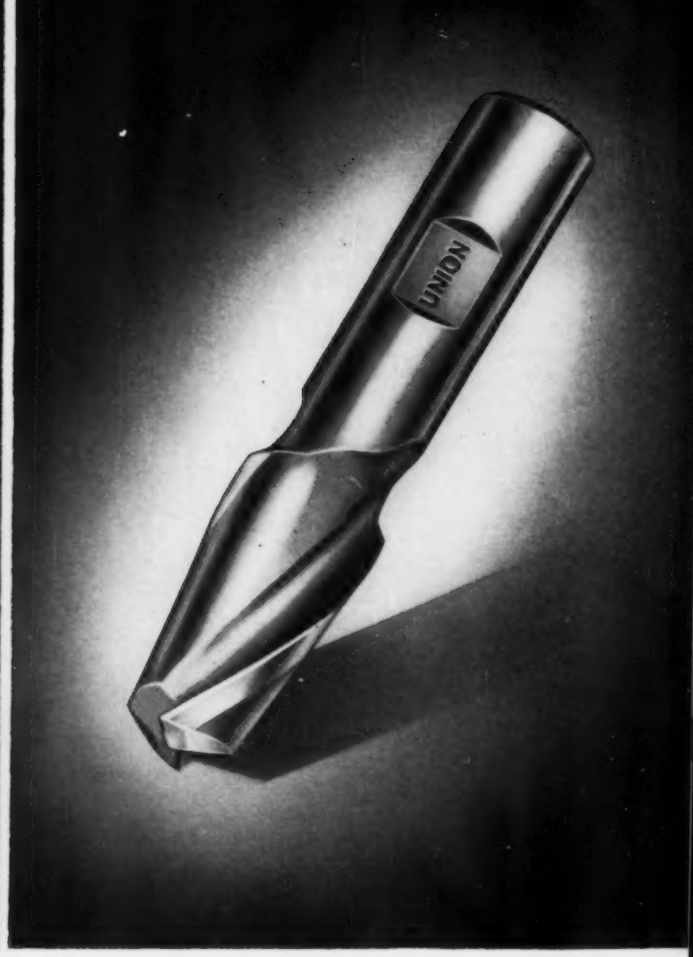
DIVISION OF UNION TWIST DRILL COMPANY

***— Serving you through the best distributors from Coast to Coast***

CIRCLE 236 READER SERVICE CARD

*If you use end mills as fast as welders use welding rods...*

*This brand cuts down your end mill usage, production time and costs!*




# *The more you use end mills the more you need Union*

Union end mills have the uniform top quality that gives you lower costs per piece produced — more production volume per end mill. Union also manufactures drills, milling cutters, gear cutters, reamers, hobs, carbide tools and inserted blade cutters of the same uniform top quality. **Available nationally through Union Distributors** and stocked in Union warehouses in Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York City and San Francisco.

UTD

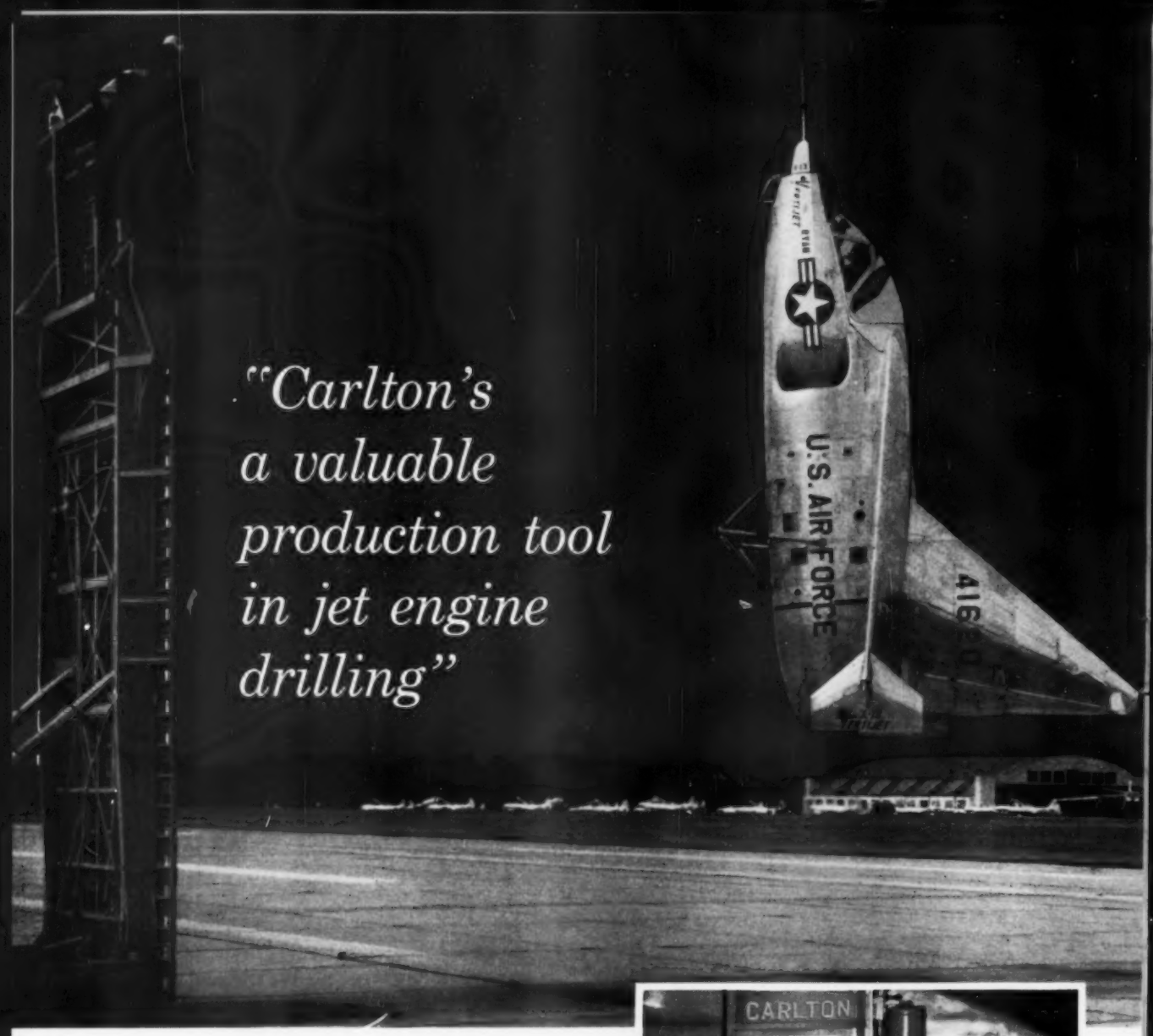
# UNION

TWIST DRILL COMPANY, Athol, Massachusetts

S. W. CARD DIVISION, Mansfield, Mass.; BUTTERFIELD DIVISION, Derby Line, Vt.

***See Your UNION DISTRIBUTOR for cutting tools that will save you time and money***

**CIRCLE 237 READER SERVICE CARD**




# *"Carlton's a valuable production tool in jet engine drilling"*

Robert L. Clark, Works Manager, Ryan Aeronautical Co., San Diego, has supervised the production of hundreds of Ryan jet engine structures like the sensational Vertijet shown above. He says:

"Carlton is the kind of radial drill you can count on for production hole drilling like the jet engine H-ring (below)."

It will pay you to investigate Carlton radial drills for *all* your drilling and boring requirements. Unlimited choice of arm and column sizes and the most modern programming-preselect speed-feed control systems. Write for descriptive bulletins. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

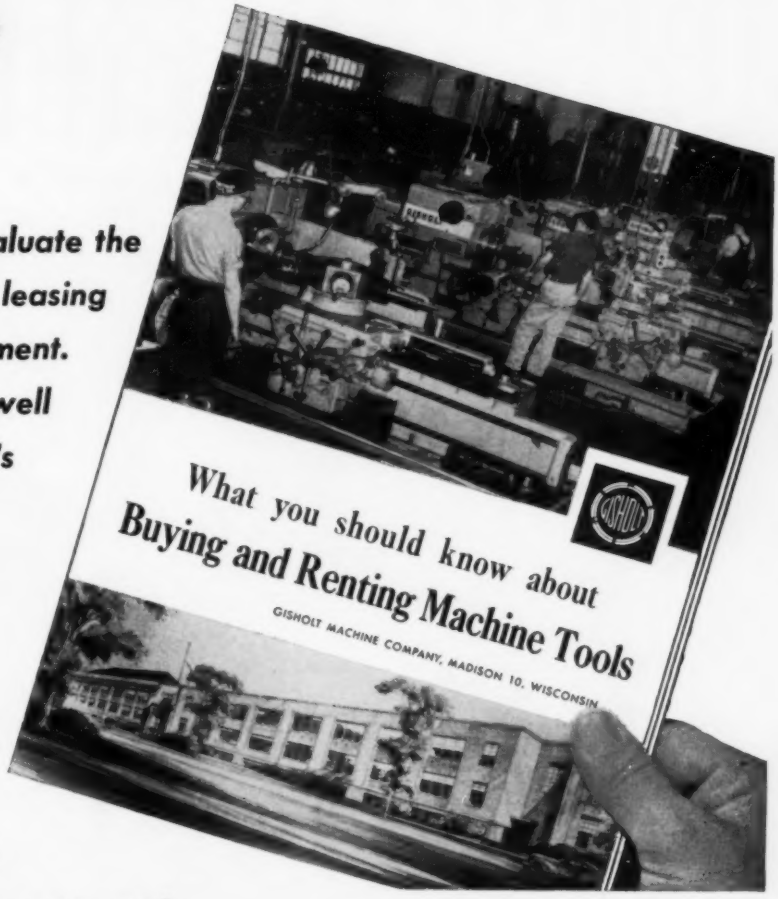
*Carlton 3A Radial* drills and reams 200 holes in the H-flange of this Ryan jet engine component.

**Carlton** ... *specialists in Radial Drills*

CIRCLE 238 READER SERVICE CARD

# Can your competitors turn metal at lower costs?

***Now** is the time to re-evaluate the possibilities offered by leasing of new production equipment. Your decision today can well determine your company's position in tomorrow's competitive market.*




## This free booklet tells how you can get new machines with minimum capital outlay

If you have delayed replacing old machines because of the relatively large capital investment, acquisition by methods other than outright purchase may solve your problems. Only a minimum initial investment provides you with the many competitive advantages that new machines offer, including greater accuracy, higher production rates and faster setup. New features and accessories simplify even the toughest jobs. Secondary operations are minimized and spoiled work becomes a thing of the past. All this means lower unit cost—more profit for you.

If you want the benefits that new machine tools can provide, and if you like the idea of letting them "pay their way" while they "turn" a profit for you, you'll want to write for Gisholt Bulletin 1173 on buying and renting machine tools. It fully explains one of the most liberal and comprehensive policies in the industry, and covers several types of leasing and time payment plans with vital information on depreciation, tax angles, the MAPI formula and other timely questions. The coupon will bring your free copy. Send it along today.

**GISHOLT MACHINE COMPANY**
**Madison 10, Wisconsin**

**ASK YOUR GISHOLT REPRESENTATIVE ABOUT FACTORY-REBUILT MACHINES WITH NEW-MACHINE GUARANTEE**

Gisholt Machine Company
1201 E. Washington Ave.
Madison 10, Wisconsin

Without obligation, please send your Bulletin 1173.

*Name*.....*Title*.....

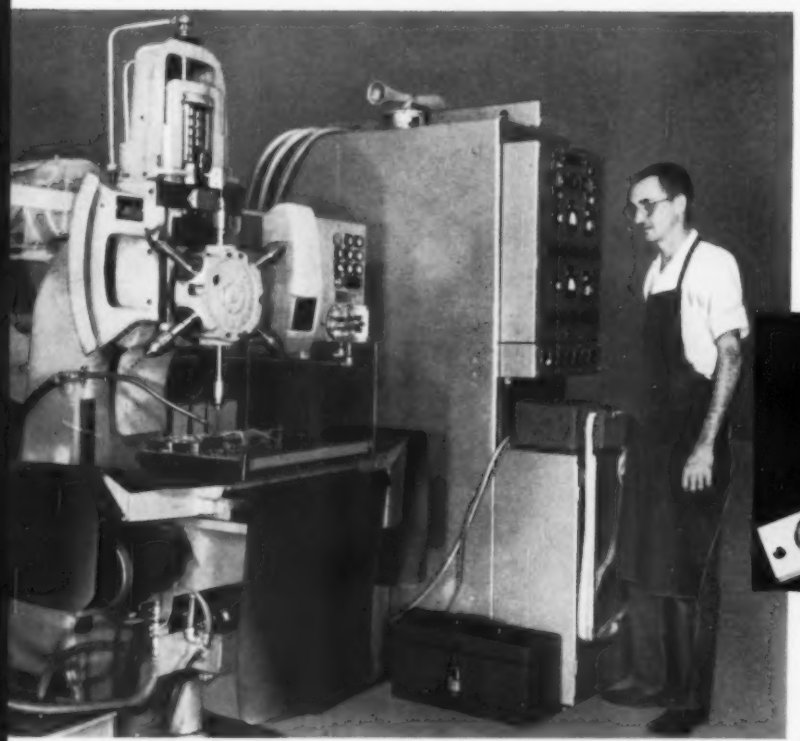
*Company*.....

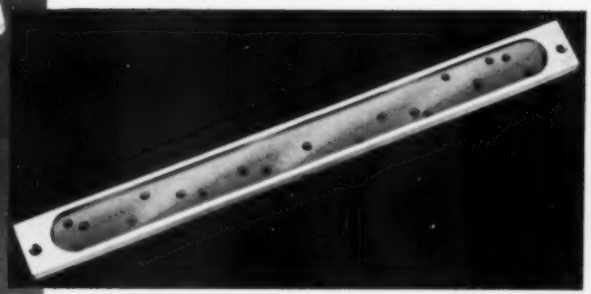
*Street address*.....

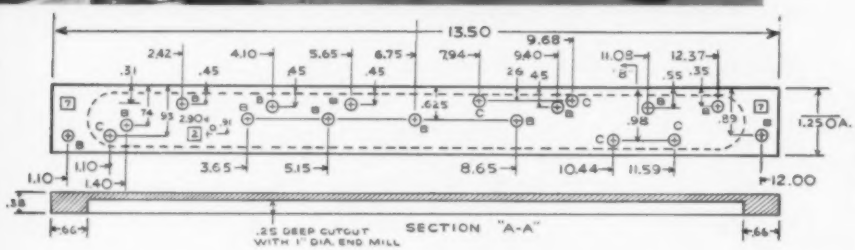
*City*.....*Zone*.....*State*.....

## Aircraft Mounting Feet Set-Up and Production T

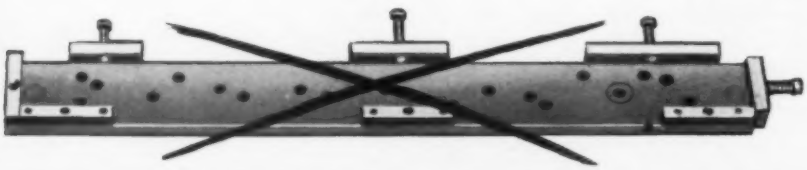
# BURGMASTER G.E. Tape








Aluminum Mounting Foot for Aircraft Voltage Regulator, size 13.50 x 1.25 x .380 showing 21 drill operations performed on 61 parts in 8 hours, 36 minutes, including set-up, programming and production time.

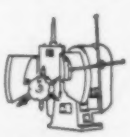


$85 Drill Jig eliminated by use of punched tape control. Fixture required 17 hours to make vs. one-half hour for programming and making punched tape.

**Specialists in High Production Turret Drilling**

1C Manual Power Index ⅜" Capacity

2B Manual Power Index ¾" Capacity



2BF Flange Mounted Power Index ¾" Capacity

2BH Automatic Hydraulic ¾" Capacity

3BH Automatic Hydraulic 1½" Capacity

2BR Ram Type Radial Drill ¾" Capacity

2BHT—3BHT Automatic Tape Controlled ¾" and 1½" Capacity

# Time Reduced 68% — $85 Drill Jig Eliminated

(AT G.E., WAYNESBORO, VA.)

# Controlled Turret Drill

(¾" DIAMETER CAPACITY IN STEEL)

## with automatic numerically table positioning control

Total programming for this part was one-half hour vs. jig making time of 17 hours and the total production time of 61 parts was cut from 26 hours, 24 minutes to 8 hours, 36 minutes—a savings of 68%.

Important is the fact that small lots can be efficiently machined with inexpensive holding clamps to effect even greater savings. Short set-up time permits the Burgmaster to be used on a multiplicity of parts with standard or inexpensive tools. Furthermore, punched tapes can be stored indefinitely for future use—duplicate tapes can be made in seconds—and in case of design changes, new instructions can be typed in at any point.

### Maximum Flexible Automation

The application of G.E. Numerical Controls to either Standard Burgmaster 6-spindle or 8-spindle turret drilling, tapping and boring machines results in maximum flexible automation. That is, these **field proven Burgmaster machines** can be quickly and economically set up to produce a large variety of parts using standard tools and simple holding clamps. The standard Burgmaster hydraulic controls are maintained... including pre-selective spindle speeds, infinitely variable pre-selective feeds, selective rapid approach and return, skip indexing, precision depth control, and simple manual controls for set-up. The G.E. numerical system controls all machine functions, selects spindles in any sequence, automatically positions the table on two axes, clamps the table while machining operations are performed, and controls coolant. Up to six operations can be performed at any command position without moving the table. All operations are carried out at their most efficient rate for high finish, precision, speed, and longest tool life. As a result one man can operate two or more machines on many jobs, or by attaching two tapes together one part can be machined on one end of the table while work is being set up on the other to effect constant machine operation.

Why not get all the facts on your work. There is a Burg direct representative or dealer near you... call him... there is no obligation.

**Programming and Tape Preparation**
Manufacturing personnel transpose drawing decimal dimensions to a program sheet including feeds, speeds, spindle sequence, and any auxiliary functions. A typist then prepares the standard eight-hole punched tapes in a matter of minutes and checks it for accuracy from a typed tape produced at the same time. Duplicate tapes can be produced in seconds, and new instructions (representing design changes) can be typed in at any point.

### JOB FACTS:

**Machine:** Burgmaster 2BH-T 6-Spindle Turret Drilling, Tapping and Boring Machine
**Control:** G.E. Numerical Control
**Part:** Aircraft Mounting Feet for Voltage Regulator
**Material:** 52 S A1.
**Quantity:** 7 lots of 61 each—total 427 parts
**Holding:** Two Universal finger clamps and 1" Spacer Bar
**Accuracy Required:** .003" Hole Dia. ±.005 Hole Position

| Operations | Speed | Feed |
|---|---|---|
| #1 Center Drill | 1250 | .004 |
| #2 9/32 Drill (.281") | 1000 | .008 |
| #3 #6 Drill (.204") | 1250 | .005 |
| #4 #10 Drill (.193) | 1330 | .004 |
| #5 9/64 Drill (.140) | 2000 | .005 |

**Former Method:** Six Spindle Drill Press
Special Drill Jig—17 hours to make
Set-up—3 hours, 24 minutes
Total Production Time: 26 hours, 24 minutes

**Present Method:**
Set-up—2 hours, 25 minutes
Programming Time: 20 minutes
Proof-read Tape: 10 minutes
Total Production Time: 8 hours, 36 minutes

**Savings:**
Eliminate $85 Jig
Program Time of One-half Hour vs. Jig Making of 17 hours.
Set-up and Production Time Reduced 17 hours, 38 minutes or 68%.

Write for Bulletin describing Burgmaster 6 and 8 Spindle Tape Controlled Turret Drilling, Tapping, and Boring Machines. 30-minute 16mm sound film showing all Burgmaster Turret Drills in operation is available from any office without charge.

**BURG TOOL**
MANUFACTURING COMPANY, INC.
15001 South Figueroa Street, Gardena, California
Tel. FAculty 1-3510, TWX—Compton, California 6011

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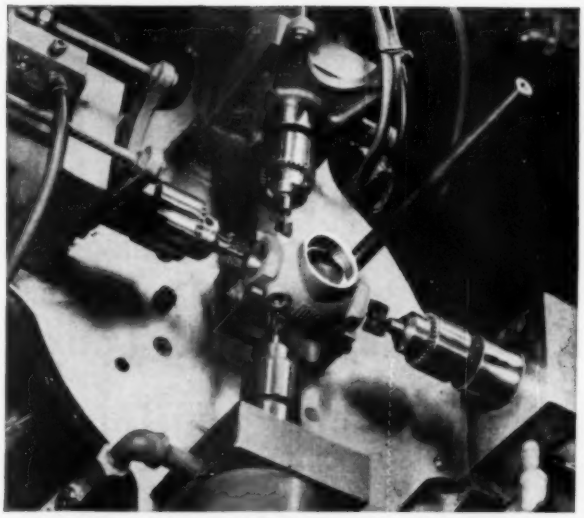
**DETROIT:** BURGMASTER MICHIGAN SALES DIV., 13730 W. 8 Mile Rd., Detroit 37, Mich., LI. 8-4333
**SAN FRANCISCO BAY AREA:** WALT COOPER, 1341 Old Country Rd., Belmont, Calif., Tel. LYtell 1-0309
*Plus dealer representatives in other industrial centers.*

CIRCLE 241 READER SERVICE CARD

# How to speed production with power brushing

Here's a sure way to speed production ... cut costs ... improve product quality —*Osborn Power Brushing.* Let us show you how to clean, finish and deburr metallic or non-metallic parts, large or small with efficient, low-cost power brushing today.

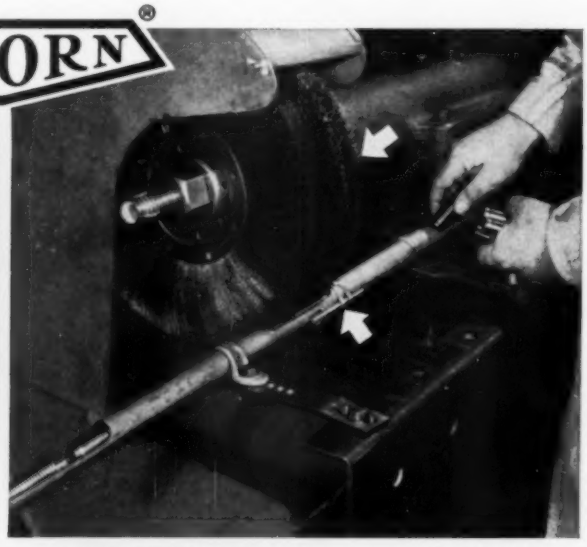
The uses for power brushes in industry for metal finishing are virtually unlimited. An **O**sborn **B**rushing **A**nalyst can show you how to benefit. Write *The Osborn Manufacturing Company, Dept. C-74, Cleveland 14, Ohio.*



**SPEED BURR REMOVAL**—The 4 threaded ports in this valve body are being deburred and cleaned in one fast operation by Osborn Situft® Brushes and this simple power brushing setup. Doing the job by hand was slow, costly. Now Osborn Power Brushing does it 66% faster ... saves 8 manhours per thousand parts.

OSBORN®

**SPEED FINISHING**—These aluminum ammunition components are finished at high production rates ... to meet rigid quality control standards. Here, three Osborn Master® Wheels plus simple rotating fixture setup finish pieces at a rate of 1400 per hour. Feather burrs are thoroughly removed ... surface junctures are blended uniformly to cut the cost on this job 74%.



**SPEED CLEANING**—For cleaning set-screw threads, this manufacturer relies on Osborn Power Brushing. Operator feeds screws into a simple pipe-fixture ... Osborn Monitor® Brushes spin and clean them fast, thoroughly. A stationary Osborn Situft® Brush controls rotation and traverse of the screws across brush faces. Cleaning time is cut from 18 to 2 seconds per piece.

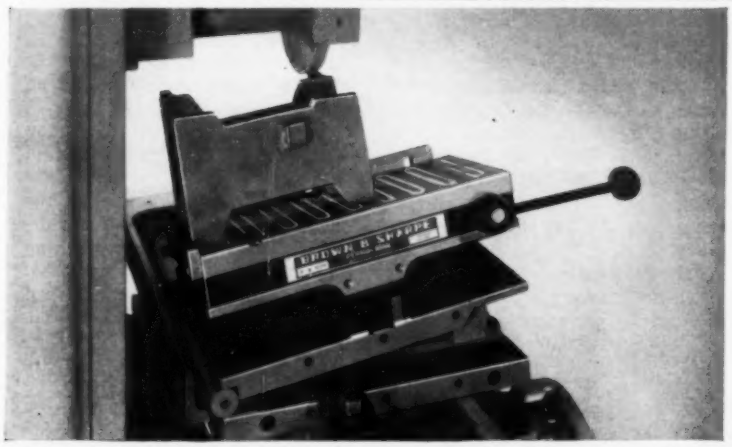
Write TODAY for Osborn Catalog 210-C.

Osborn Brushes

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES • BRUSHING MACHINES • FOUNDRY PRODUCTION MACHINERY

# Precision Tool News

NO. 7 B·S REPORTING NEW DEVELOPMENTS AT BROWN & SHARPE'S PRECISION CENTER



## 8 New B&S Sine Tools Speed Precise Angular Settings for Work-Holding and Inspection

Brown & Sharpe's new Perma-Sines establish angles quickly and precisely . . . hold work magnetically, without clamping. Their permanent-magnet surfaces switch ON or OFF at the turn of a lever, yet require no electrical connections. "Firm" hinges eliminate the need for clamping plates and possible distortion during attendant tightening. Direct contact of the rolls with gage blocks prevents inaccuracies caused by intervening members (with the spacing necessary between such members and rolls). All parts except magnetic surfaces fully hardened; top plate flat to .0002" all over; roll centers held to .000030" per inch.

Brown & Sharpe Inspection Sine Plates have tapped holes for holding devices in sides, ends and tops . . . offer maximum accuracy for inspection work. Flat *over-all* to .0002", they are made of normalized and seasoned steel, *fully hardened throughout.*

B&S Perma-Sines and Inspection Sine Plates are both available in simple and compound types; 5" and 10" sizes.

### New B&S Square Shows Amount of Out-of-Squareness at a Glance

One end of the B&S Direct Reading Cylindrical Square is precisely ground and lapped "out of square" to a predetermined degree. When the square is rotated, its angle with the base surface will at some point match the angle of the work piece, and shut out light against the work. Out-of-squareness is then read directly in .0002" by following the dotted curve nearest the top of the work edge to the top of the cylinder. The other end is precisely square with the cylinder.

### New B&S Hite-Cheks for Use with Test Indicators Provide Higher Accuracy at Lower Cost

To transfer the very accurate dimensions set up by B&S Hite-Sets, Hite-Icators, etc., devices are required that will support any dial test indicator . . . in any position . . . *without chatter or other vibration.* Brown & Sharpe's new Hite-Cheks (right) do this job superbly. Hite-Cheks repeat all "low" and "high" measurements precisely, even with high-amplification indicators; are lower in price than all graduated devices.

Unusual, box-type uprights of aluminum provide rigidity and stability without excess weight; sturdy bases, with hardened and lapped graphitic steel wear pads *do not chatter.* Two-piece sliding heads provide quick rough settings, positive fine adjustments . . . can be securely clamped. 24", 36" and 48" sizes.

### These Tools Available Now Through Your B&S Distributor

Brown & Sharpe's newest accuracy-boosting, cost-cutting tools are available through your nearby B&S distributor . . . at factory prices. Brown & Sharpe Mfg. Co., Providence 1, R.I.

PROGRESS IN PRECISION FOR 125 YEARS

**Brown & Sharpe** B·S

PRECISION TOOLS AND GAGES • MILLING, GRINDING AND SCREW MACHINES • CUTTERS • MACHINE TOOL ACCESSORIES • PUMPS AND HYDRAULIC PRODUCTS

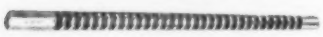
**Save Time**
**with**
**STANDARD STOCK**
**BROACHES**

*Minute Man*
**KEYWAY BROACH KIT**

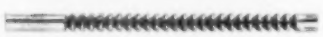
In one minute and for as little as one cent you can cut a keyway with this kit. For keyways from 1/16" to 1" in any bore from 1/4" to 3".

*Minute Man*

**SQUARE BROACHES**



**HEXAGON BROACHES**



***New* ROUND BROACHES**

Used in an arbor or hydraulic press for finishing holes to exact size in *one pass*. 1/8" to 3/4" squares and hex's; 1/4" to 1" rounds. Production Type Keyway Broaches also in stock.

**SEND FOR CATALOG AND PRICE LIST**

**The duMONT CORPORATION**
**Greenfield, Mass.**

MAIL FREE BROACH CATALOG AND PRICE LIST A describing Square Broaches, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

*Name*.....

*Company*.....

*Address*.....


# Letters...

To American Machinist
330 W 42nd St, NY 36, NY

## Perforated pages

Dear Sirs:
In reference to the suggestion advocating perforation of your Refernce Book Sheets, I am very pleased to note the results.

Naturally, there must have been others with the same idea but lacking pen and ink to promote same for the benefit of fellow readers.

Parenthetically, your Detroit coverage answers a need which present-day commercial advertising, by its nature, is unable to fulfill.

Karl Engelmann
*Brooklyn, NY*

*We have always wanted to perforate the Reference Book Sheets, but it is only recently that a method was worked out to fit this operation into our fast production schedule*—Ed.

## Chinese pipe

Dear Sirs:
With reference to the "Spot News" item on extrusion of pipe in Red China, (*AM*—May 19 '58, p81), we should be very interested to know the source of your information.

If it is possible to get further information for us, we should be most grateful.

Terence E Dancy
*Pittsburgh, Penna*

*The information came from our Tokyo News Bureau and was originally monitored from Peking Radio. Efforts to secure additional information on this kind of lead are almost always fruitless*—Ed.

## Aluminum engine

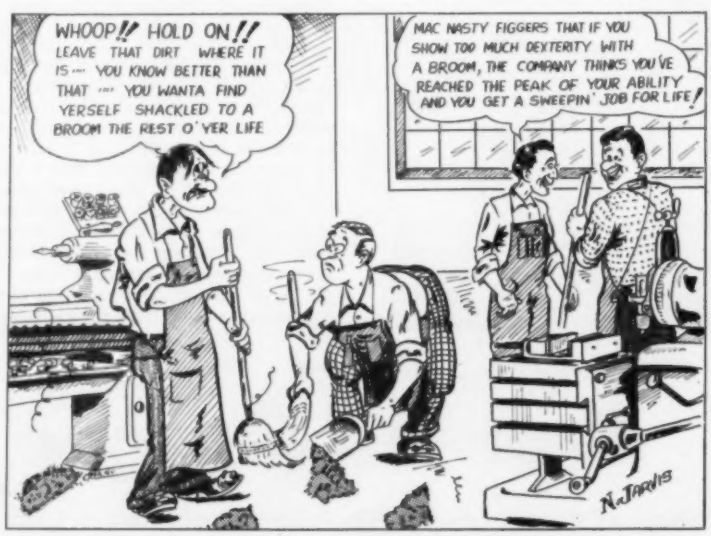
Dear Sirs:
We note that Chevrolet is shelving the "aluminum version of their six-cylinder engine" (*AM*—July 14 '58, p69).

You will be interested to know that we have developed an aluminum engine, the first model being equipped for aircraft. This was certified for installation by the Civil Aeronautics Administration and is now undergoing flight tests.

We are increasing the horsepower from 200 to 250 and reduc-

## *SHOPMATES*

*N. Jarvis*


WHOOP!! HOLD ON!! LEAVE THAT DIRT WHERE IT IS — YOU KNOW BETTER THAN THAT — YOU WANTA FIND YERSELF SHACKLED TO A BROOM THE REST O' YER LIFE
MAC NASTY FIGGERS THAT IF YOU SHOW TOO MUCH DEXTERITY WITH A BROOM, THE COMPANY THINKS YOU'VE REACHED THE PEAK OF YOUR ABILITY AND YOU GET A SWEEPIN' JOB FOR LIFE!
N. JARVIS

# SHOW THIS TO YOUR TOOLMAKER

Ask him if he doesn't agree that the Leland-Gifford No. 2LMS Toolroom Drill Press provides every feature and convenience needed in the modern toolroom for fast, accurate, effortless drilling and tapping. Developed in cooperation with leading tool engineers, this machine has won wide acceptance as the ideal drill press for general purpose toolroom use. Write for complete information.

## LELAND-GIFFORD
### *No. 2LMS*
## TOOLROOM DRILL PRESS
### *with all these features:*

1 Illuminated indicating shift with cutting speed chart.
2 Conveniently located hand wheel for changing spindle speeds without stopping machine . . . also for shifting back gears when furnished.
3 Positive stop for accurate depth adjustment.
4 Capacity of No. 2 Morse taper. No. 3 MT optional.
5 Extra large 37″ x 25″ or standard 26″ x 25″ work table.
6 26″ swing with 13″ overhang.
7 Handy push-back table raising crank and quick-acting table lock.
8 Foot switch start-stop motor control leaves operator's hand free.
9 Counterbalanced sliding head for effortless vertical adjustment.
10 Built-in light for table and work surface illumination.
11 Sensitive hand lever feed with ratchet adjustment, or . . .
12 Reversing motor control for tapping — provides manual control from feed lever or automatic control by depth stop (optional at small extra charge).

## LELAND-GIFFORD
*Drilling Machines*

WORCESTER 1, MASSACHUSETTS, U. S. A.

**CHICAGO 45**
2515 West Peterson Ave.
**DETROIT**
10429 West McNichols Rd.
**CLEVELAND 22**
P.O. Box 853
**NEW YORK OFFICE**
75 South Orange Ave.
South Orange, N. J.
**LOS ANGELES OFFICE**
2620 Leonis Blvd.
Vernon 58, Cal.
**INDIANAPOLIS 6,** P. O. Box 1051
**ROCHESTER 12,** P. O. Box 24, Charlotte Station

we took the puzzle out of jig boring

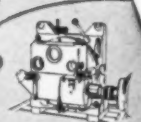
with the

# DIXI 60

## horizontal optical jig borer

(Made in Switzerland
Measurements in inches)

The only horizontal jig borer that combines the accuracy of the vertical spindle with the versatility of the horizontal spindle.



DIXI 450 Optical Precision Rotary Table

**ACCURACY:** Optical settings provide an overall accuracy of .0002".

**VERSATILITY:** The combination of the Dixi 60 and the Dixi 450 precision optical rotary table (illus.) permits jig-less boring, facing, milling and drilling work in all planes and compound angles between them with optical interrelationship all in one set-up.

**PRODUCTIVITY:** A complete optical setting including unclamping, positioning, fine adjustment, reclamping and rechecking takes less than 10 seconds. Convenient and functional controls eliminate idle machine time.

The DIXI Optional Reversing Process assures perfect alignment in work pieces with line bores, as well as round, taper-free holes. Get all details on this process by writing for illustrated catalog.

MBI has engineers available for consultation, guarantees service by factory trained staff, and stocks spare parts in New York.— Join the long list of leading aircraft and manufacturing plants throughout the United States which are using the Dixi 60.

MBI

**M.B.I. EXPORT & IMPORT LTD.**
A DIVISION OF MACHINERY BUILDERS, INC.
475 Grand Concourse, Bronx 51, N. Y.
"Over 25 years' experience in designing and building machinery"


ing the weight to 250 lb. This includes distributor ignition and carburetors. This model is being considered for truck operation.

Karl L Herrmann
*Herrmann Engineering Co*
*Glendale, Calif*

*The Herrmann engine has a main cam mounted on a straight shaft. Around the shaft and parallel to it are six double-ended pistons, each carrying two trunnion rollers that act against the cam to cause rotation of the shaft.*

*Advantages claimed for the engine in addition to low weight and small size are: (1) vibration is greatly reduced and (2) power is delivered more smoothly, because the engine has 12 power strokes per revolution instead of the 3 power strokes of the conventional, 6-cylinder crank engine.*

*Incidentally, to the best of our knowledge, Chevrolet still plans to use a 6-cylinder, horizontally opposed, aluminum engine in its light car. Our comment of July 14 stated that Chevrolet has shelved the redesign of the standard 6-cylinder engine*—Ed.

## Metalworking report

Dear Sirs:
Please advise us the cost and availability of "Where Metalworking is Heading" (*AM*—Mar 10 '58, p113).

C R Edwards
*Dubuque, Iowa*

*Copies are still available from stock at 30¢ per copy*—Ed.

## Helpful Henry

*by L. Hoppes*

*"Looks as though these fellows are going to be late, I'll ring in their cards for them so they won't be docked."*

## CALENDAR

**Society of Automotive Engineers**—Farm, Construction, and Industry Machinery Forum and Display, Sept 8-11, Milwaukee Auditorium, Milwaukee, Wis.

**Instrument Society of America**—Annual Instrument-Automation Conference and Exhibit, Sept 15-19, Convention Hall, Philadelphia, Penna.

**American Rocket Society**—National Meeting, Sept 15-18, Statler Hotel, Detroit, Mich.

**Pressed Metal Institute**—Annual Meeting, Sept 28-Oct 2, The Cloisters, Sea Island, Ga.

**Society of Automotive Engineers**—Aeronautic Meeting and Display, Sept 29-Oct 3, Ambassador Hotel, Los Angeles, Calif.

**American Society of Tool Engineers**—Semiannual Meeting and Western Tool Show, Sept 29-Oct 3, Shrine Exposition Hall, Los Angeles, Calif.

**American Society of Mechanical Engineers and American Society of Lubrication Engineers**—Lubrication Conference, Oct 14-16, Statler Hotel, Los Angeles, Calif.

**Society of Industrial Packaging & Material Handling Engineers**—Annual Meeting and Exposition, Oct 14-16, Chicago Coliseum, Chicago, Ill.

**American Machine Tool Distributors Association**—Annual Meeting, Oct 16-17, The Sheraton Plaza, Boston, Mass.

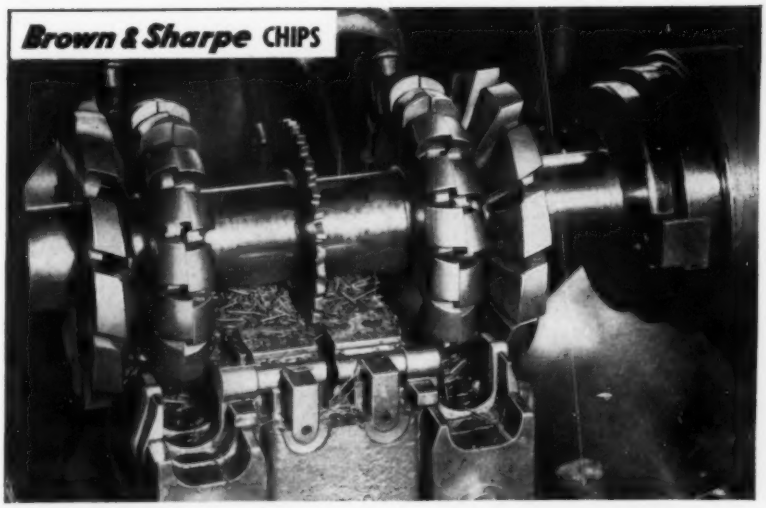
**Magnesium Association**—Fall Meeting and Exhibit, Oct 16-17, Fort Shelby Hotel, Detroit, Mich.

**National Safety Council**—Annual Safety Congress, Oct 20-24, Hilton, Congress, Morrison, and LaSalle Hotels, Chicago, Ill.

**American Gear Manufacturers Association**—Semiannual Meeting, Oct 26-29, Edgewater Beach Hotel, Chicago, Ill.

**American Institute of Mining, Metallurgical & Petroleum Engineers**—Fall Meeting, Institute of Metals Div, Oct 27-31, Carter Hotel, Cleveland, Ohio.


**Brown & Sharpe CHIPS**



# Gang Cutters perform 5 Milling Cuts in 48 Seconds!

*Dual Frame Forging Ready For Milling—Slitting Saw Separates 2 Parts.*

*Completed Brown & Sharpe Micrometer*

**Precision B&S Cutters Produce Precision B&S Micrometer Frames**

Shearing action designed into these special Brown & Sharpe cutters gives a smooth, accurate finish on tough steel micrometer frame forgings.

Uniformity of product is vital... and positive, close tolerance milling is accomplished through experienced cutter development to produce fine surface finishes with no overheating, no piece distortion.

Angular-gash design of the outside form-relieved cutters quickly, precisely and economically mill outside contour. Two pairs of interlocked form-cutters (second from end) give smooth micrometer throat surface finish without chatter or scoring.

Even the cutter chips indicate the degree of precision built into B & S PRODUCTIONEERED cutters.

Call on the local Brown & Sharpe Cutter Engineer to trouble-shoot your production problems.

Write for 96 page Catalog 37C showing over 2500 High Speed Steel Tools and Accessories to: *Cutting Tool Division, Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.*

PROGRESS IN PRECISION FOR 125 YEARS

**Brown & Sharpe**

CUTTING TOOL DIVISION

NELCO CARBIDE TOOLS B&S HIGH SPEED STEEL CUTTERS

PRECISION TOOLS AND GAGES • MILLING GRINDING AND SCREW MACHINES
MACHINE TOOL ACCESSORIES • PUMPS AND HYDRAULIC PRODUCTS

*How fast do you want to drill...*

# 10,000 RPM MAYBE 15,000 OR 20,000 ?

Fixed center oil-circulating multiple spindle head with vertical adjustment spindles.

U. S. Drill Heads are designed to provide the fastest drilling speeds that may be required—and to maintain their accuracy over long-run production. Take the Fixed Center Head shown—a close-center, oil-circulating model with full ball bearing design and its own built-in oil pump: this 7-spindle model operates regularly in production at 15,000 rpm with very little heat! Rugged, too! It is built with more reserve stamina than you'll ever need. And as in all U. S. Heads, shaved gears assure quiet, smooth operation—at all speeds.

Write for catalog FC-57 showing a full size range of standard and special fixed center multiple spindle drilling heads and individual lead screw tapping heads.

US DRILL HEAD

We manufacture all types of adjustable and fixed center drilling heads, and individual lead screw tapping heads. Ask us to help solve your multiple hole problems.

**UNITED STATES DRILL HEAD CO.**

**BURNS STREET • CINCINNATI 4, OHIO**



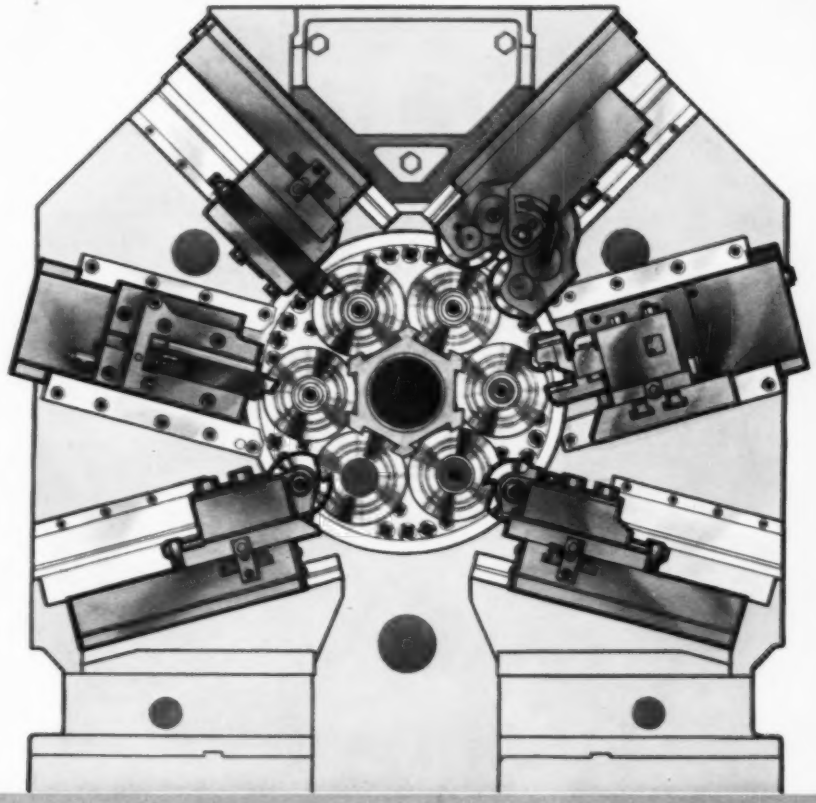
CIRCLE 248 READER SERVICE CARD

CIRCLE 249 READER SERVICE CARD ►

*Look at New Britain's*

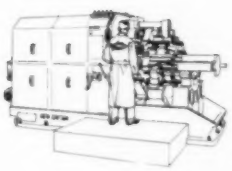
## new cross slide arrangement

Independent radial cross slides in *all* positions, providing maximum clearance for more cross slide operations.

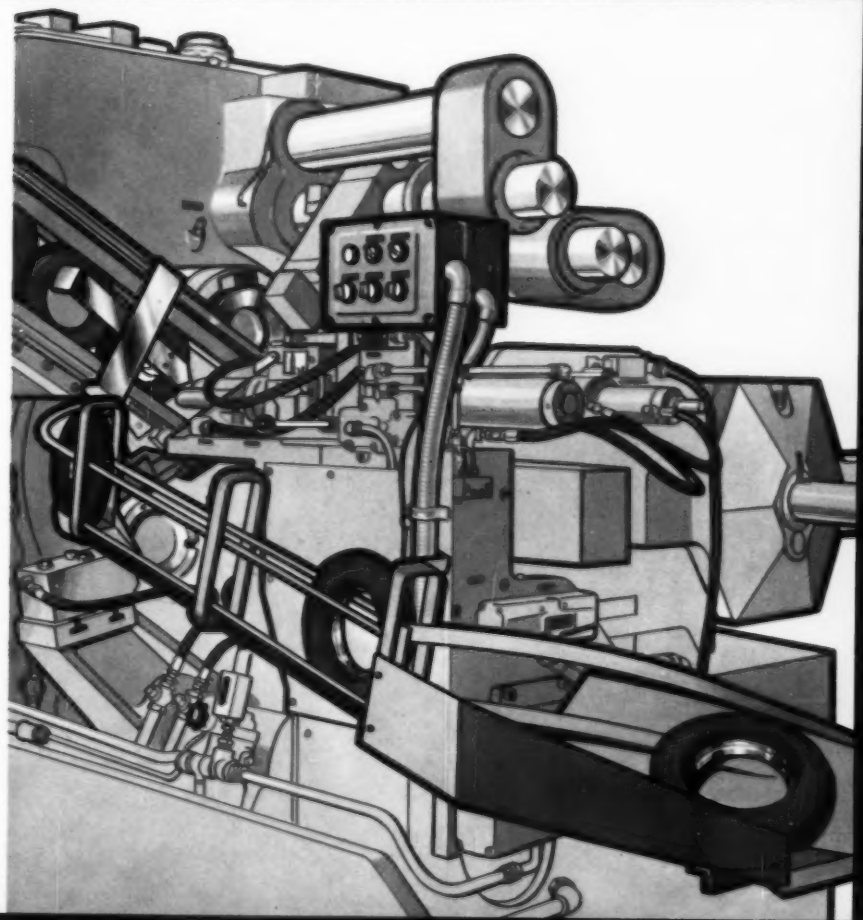


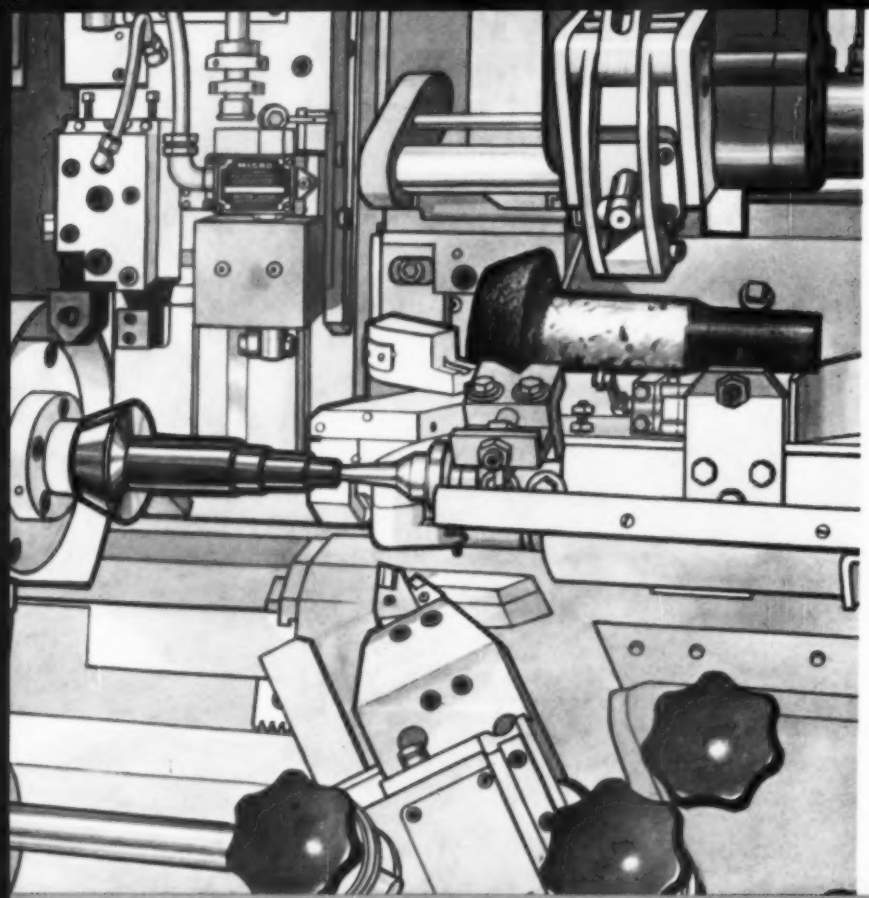
*Look at New Britain's*

## open-end chucker design

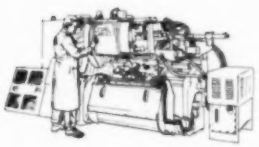


Greater accessibility for all applications and particularly well adapted to automatic handling of pieces. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

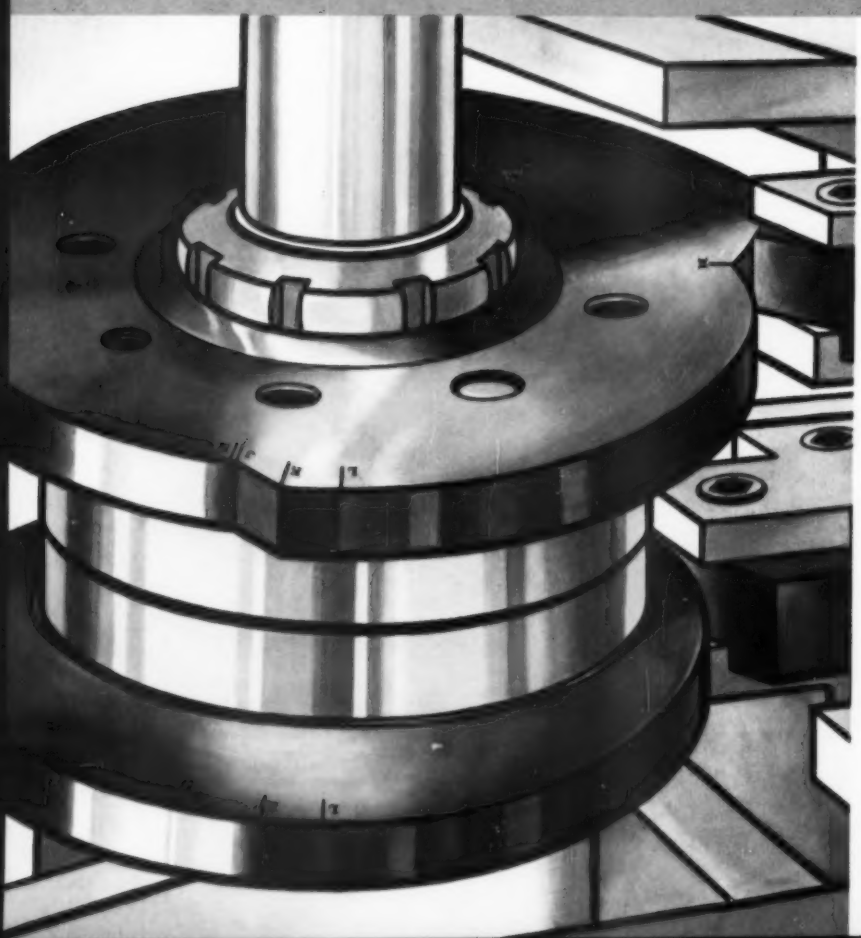




*Look at*
*Automatic Loading on*
**New Britain +GF+**



This basic optional feature can make money for you whether you are working with forgings, bar slugs, or bar stock.

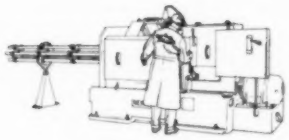


*Look at New Britain's*
**cam-controlled boring machine**

When you are working to tenths there is no substitute for the positive tool control that only precision cams provide. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

*Look at New Britain's*

## new cross slide arrangement



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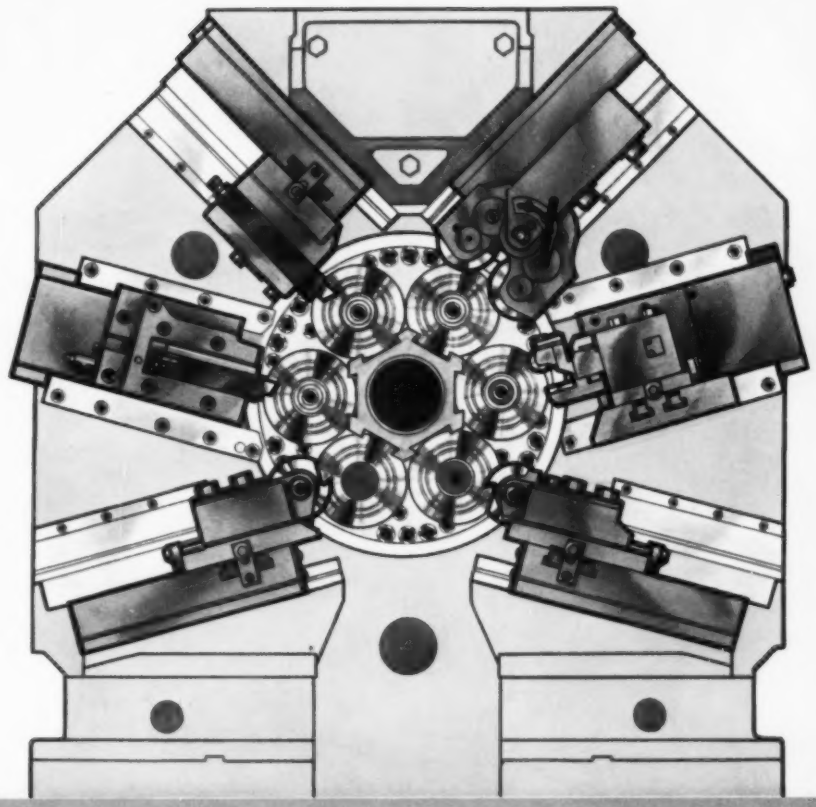

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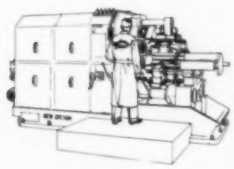

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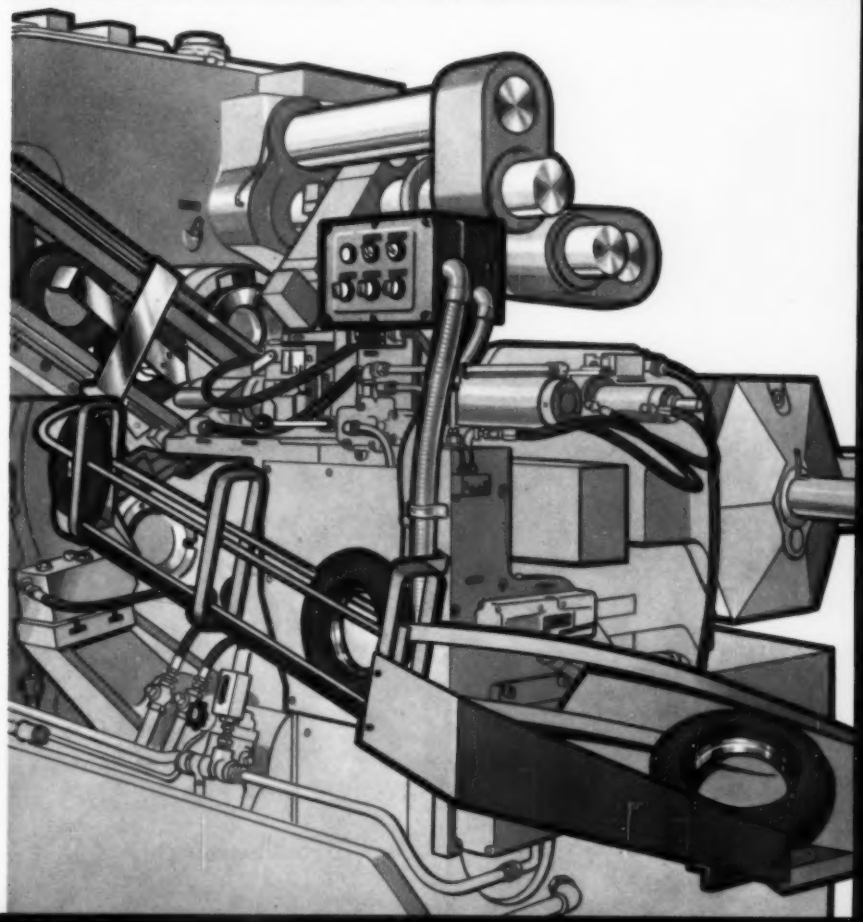
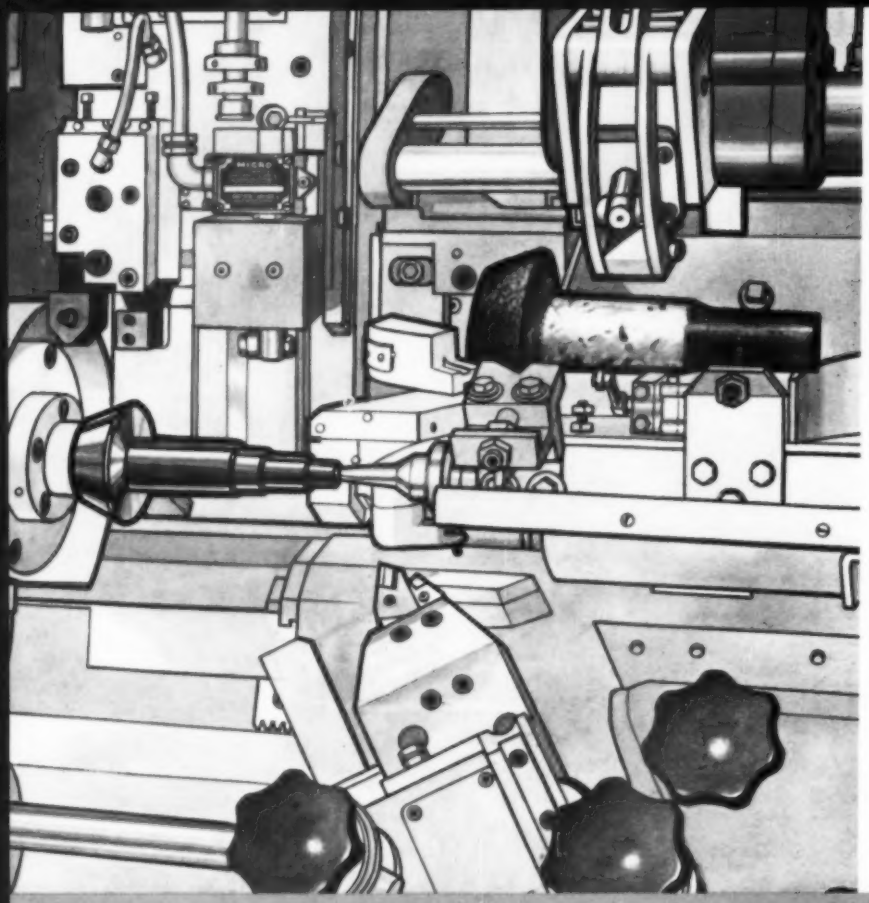
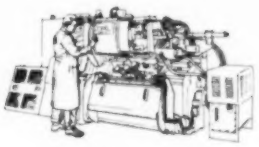




*Look at*
*Automatic Loading on*
**New Britain +GF+**



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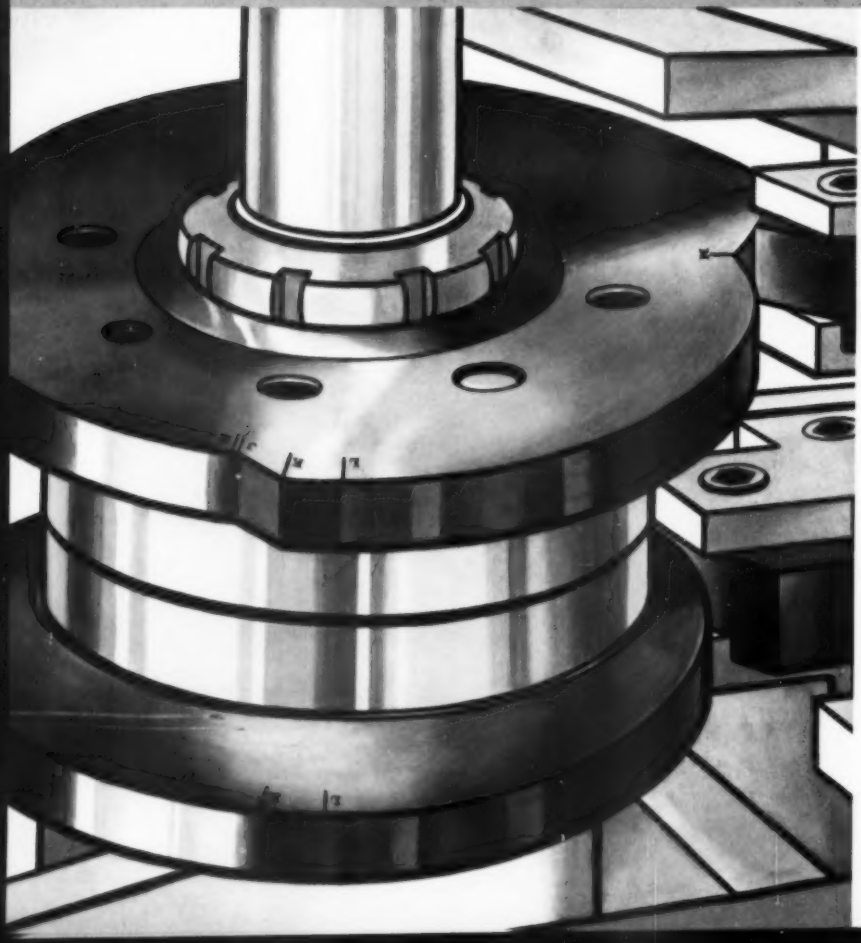

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When you are working to tenths there is no substitute for the positive tool control that only precision cams provide. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

# SPOT NEWS...

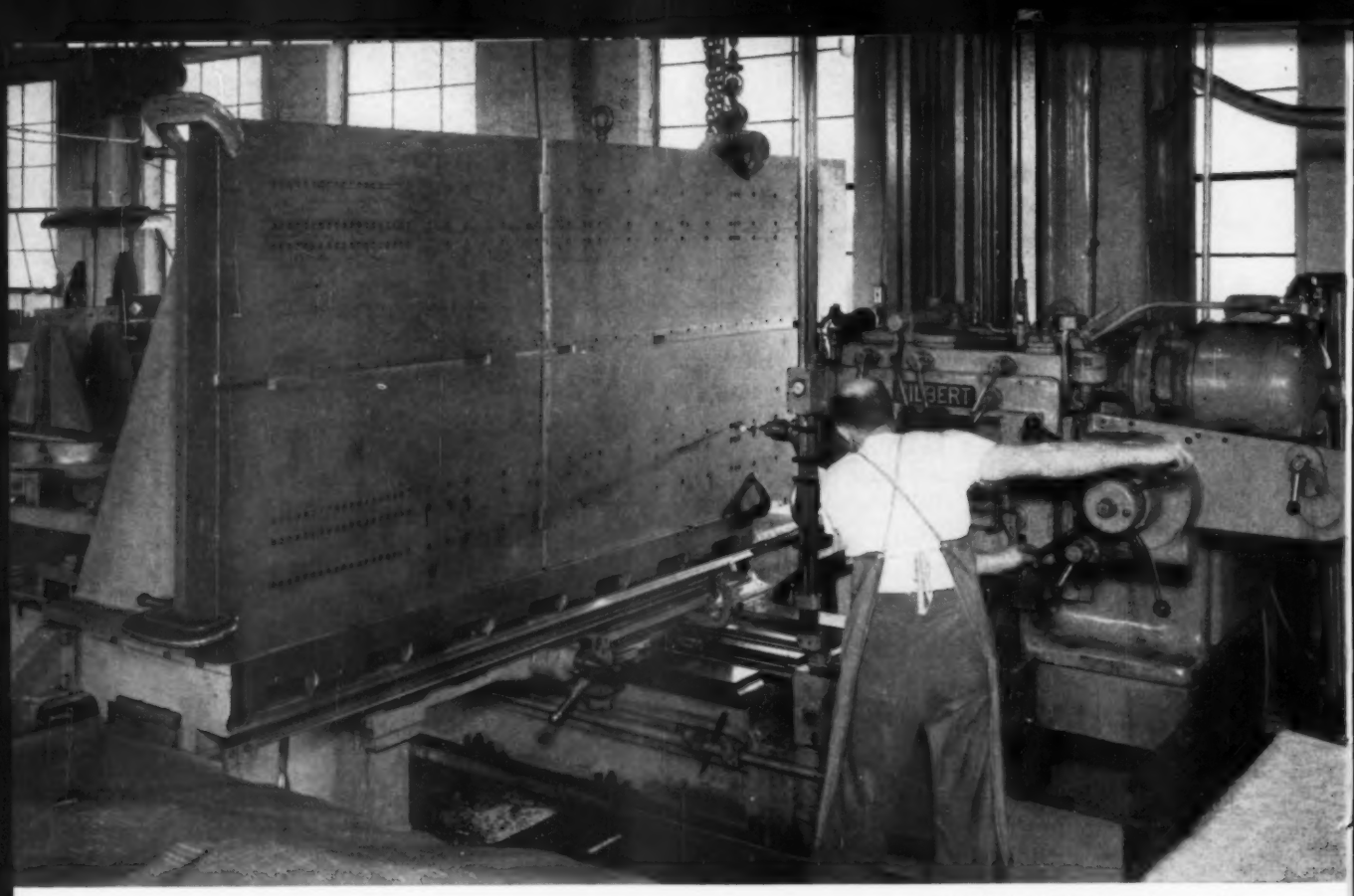
- **British didn't relax as many restrictions as anticipated** under revised COCOM embargo lists (goods that can be shipped to Red Bloc countries), but the U S on the other hand, according to informed government sources, may relax its machine tool embargo list more than anticipated (see p57).
- **Use of controlled frequency vibrations during pouring** and solidification of castings is believed to be a major factor in Russia's production of missile parts able to take the terrible beating they get in flight. Subject was discussed at a recent meeting of Ukrainian Academy of Science, Kiev.
- **Strikers won (or lost) a strike against themselves** at Cleveland Pneumatic Tool Co after a nearly two months' walkout. Firm's more than 1000 hourly rated employees, as a group, own 49% of company stock, executives and non-hourly rated employees 51%. Strikers won a sliding-scale wage increase, right to limit subcontracting that results in worker layoffs.
- **U S Equipment Co, Detroit,** which bought out Packard's entire $40 million complement of machine tools for making V-8 engines, has resold the crankshaft and camshaft equipment in Australia, India and Germany, has interested customers for the entire engine block line in Japan and England.
- **Station-type rotary indexing machines** capable of a wide variety of roughing *and* finishing operations are now being built by a large machine tool builder. By combining finishing with preliminary machining, 12 out of 14 men are being saved on one job, and machine will pay for itself in 18 months.
- **Air-controlled guards are safer than two-hand control for presses.** When the guard drops, air bleeds so that only an annoying rap on the fingers occurs if they are in the way. The main port is not uncovered until the drop guard can drop below finger level.
- **All-welded aluminum bridge trusses are currently being tested** by Army Engineers for tactical bridges. They're being fabricated from a new non-heat-treatable, weldable aluminum alloy in expectation that truss components will support a 60-ton load on a 90-ft span.
- **Plans for a merger of Northrop Aircraft and American Bosch Arma** are moving along rapidly. If, as expected, the merger takes place, the resulting combine could become a major factor in the avionics, aircraft and missile fields.
- **Increased use of aluminum in 1959 passenger car models** is expected to boost that industry's consumption by nearly 50% over 1958. Average usage per car will be 57.1 lb in 1959, compared with 50 lb in 1958, and 46.3 lb in 1957. Average amount of aluminum in new models will increase 14% over '58s. Percentage difference will come from expected boost in output.
- **Metal foil half as thick as a human hair** can be welded into strong structural panels with a new process developed at Solar Aircraft, San Diego. Patented Solar machine produces sandwich core from metal ribbon 3/32 to 2 in. wide—1/1000 to 6/1000 in. thick—by forming it with rollers into a corrugated pattern. Strips press against adjacent strips, form strings of square or wave cells, which are welded at contact points at a rate of as many as 240 individual welds per sec.

## Spot index to major News stories...


Quality control at Chrysler Imperial ..... 67
Found . . . a low-alloy steel for missiles ..... 72
Ford unveils its Lima Engine Plant ..... 76
Sees widespread use of numerical control ..... 80

Washington ..... 51
Detroit ..... 53
Aircraft & Missiles 55
Machine Tools .... 57
Materials ..... 59

What's Ahead
in Metalworking 61
in Business ..... 62
Field Report ..... 118
Names in the News ..... 125




*courtesy Linden Tool and Manufacturing Co.*

# Linden's Gilbert holds 235 holes on location ±.0007″

This is the kind of job you can handle profitably if you have a good operator and a Cincinnati Gilbert horizontal boring mill.

The piece is a 50″ by 120″ base for special indexing. Linden Tool and Manufacturing Co., Dayton, O., performs these operations:

1. Mill keyways $\frac{9}{32}$″ deep, full length and width of the base. Width of each keyway is 1.000″ ± .001″.

2. Drill 235 indexing holes, .625″ diameter. These holes must be held on location within ± .0007″. In addition, center lines of the holes (horizontal and vertical) must be parallel and square with the key-ways within .001″.

This job is another demonstration of the exceptional rigidity of Gilbert boring mills. Extended table and saddle supports help to maintain accuracy and handle the workpiece. Linden Tool and Manufacturing Company uses two Gilberts to produce a broad range of quality work for its Dayton area customers.

Gilbert boring mills are built as both Table and Floor types, with spindle diameters of 3½″, 3¾″, 4″, and 5″. A selection of column heights, bed lengths, table sizes, and workholding units makes them easily adaptable to your requirements. Add to your work capacity—and your machining dollars—by getting a proposal from Gilbert now.

*The Cincinnati Gilbert Machine Tool Co.*
***3340** Beekman Street, Cincinnati 23, Ohio*

*those who buy Gilbert buy* **GILBERT** *again*

CIRCLE 251 READER SERVICE CARD

# WASHINGTON...

## Renegotiation probe...

Congress is pushing through a bill to extend the Renegotiation Act for six months (to June 1959). But the lawmakers plan a thorough study into the defense contract renegotiation program next year. This leaves the way open for some of the liberalized provisions, advocated by many defense producers, for new legal exemptions.

**The administration initially sought** a two-year renegotiation renewal. In the rush to adjourn, however, it became obvious that Congress would have little time for a serious consideration of the program. So the lawmakers are passing what amounts to a temporary extension of the Act with two new provisions: (1) allowing for appeals beyond the tax court from renegotiation board rulings, and (2) extending the law to NASA contractors.

## What new trade law means...

Congress gave the President most of what he asked in its four-year extension of the Reciprocal Trade Agreements Program. That is, time enough to negotiate with the European Common Market nations when they begin moving toward their common external tariff schedule in 1962, and authority to cut duties enough (20%) to bargain for tariff reductions in return.

**But the renewed law does not mean** a new round of multilateral tariff cuts. In fact, it will be four years before the European Market members will be ready to sign on the dotted line. And that means no new multilateral trade treaties will be put into effect before that time.

**It further means** that the U S won't be signing any new trade pacts with anyone outside Europe either, because the so-called "most-favored-nation clause" in the General Agreement on Tariffs and Trade (GATT) binds all 37 member nations to offer all others the lowest rate they offer one. Since no one will know until 1962 what West Europe's rates will be on any given item, it puts a virtual four-year freeze on tariff-cutting trade agreements.

## Higher tariffs possible...

Contrary to popular opinion, the first effect of the new trade law may be to raise rates. That's because it has wider loopholes through which domestic producers can seek tariff protection despite existing trade agreements.

Among the important new protective features in the Trade Law are these:

**It is now easier for a U S producer** to seek escape clause relief before the Tariff Commission.

**If upheld by the Commission,** the case then goes to the White House, where the President may recommend tariff boosts up to 50% above the old 1934 Smoot-Hawley rates, instead of raising them 50% over the lower 1945 schedules. And, if the President rejects a Tariff Commission recommendation for a tariff hike, Congress may now over-ride him by a two-thirds vote.

**Also, the President** and the Office of Defense and Civilian Mobilization must take new broad effects of imports on the domestic economy into account whenever a domestic producer asks for relief on grounds of his essentiality to national defense.

**On top of that,** under separate legislation passed at the same time as the trade bill, Congress gave the Treasury Dept new powers to set higher punitive duties against low-priced foreign imports under the anti-dumping law.

**The upshot is that except for specific cases,** both U S exports and imports will continue much as they have been. Machinery exports, however, may suffer from a growing trend of U S manufacturers to set up plants in Europe to "beat" Common Market competition in the future.

## Boost in defense funds...

Congress has tacked on $815 million to the fiscal 1957 defense appropriation. The final sum amounts to $39.6 billion—the largest peacetime defense appropriation ever. Still pending is at least $1.2 billion more in a separate appropriation for military construction.

**The extra funds are earmarked** mainly for (1) construction of four additional atomic-powered, Polaris IRBM-armed submarines (bringing the total scheduled fleet to nine vessels) and two extra amphibious assault ships; (2) a speed-up for the Air Force's Minuteman solid-propellant ICBM and Hound Dog missile projects; and (3) production of 15 additional Boeing KC-135 jet tanker planes and long-range transport aircraft.

**The final appropriation bill** is a compromise between House and Senate proposals—it runs $1.2 billion over the lower house's original appropriation and $440 million under the Senate's initial bill.

**Administration officials**—including Defense Secretary McElroy—hint strongly that all of the additional money voted by Congress may not be spent. But the Pentagon's military professionals—particularly in the Army—are itching to use the funds. The final decision is up to the White House.

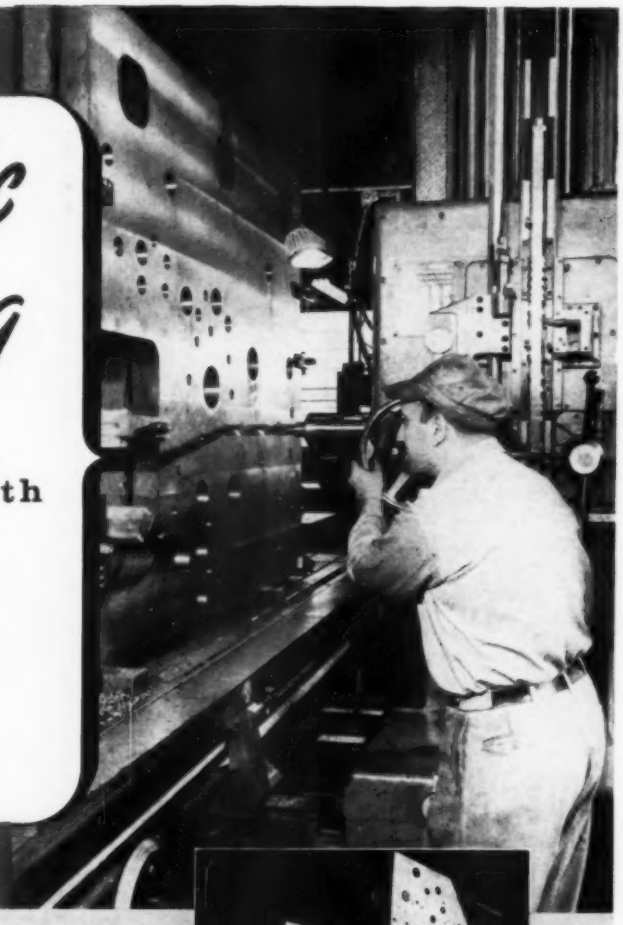
# *Automatic Positioning*

**Reduces Production Costs with**

**BULLARD**

# H.B.M.

**MODEL 75**



**The experience of George Hantscho Company, Inc., Mount Vernon, New York, builders of equipment for the printing industry, is typical of that enjoyed by users of Bullard H.B.M., Model 75.**

**THE PROBLEM**

To bore 105 holes, from 5" to ½" in diameter, in both side frames of paper folding machine to support rollers, gears and folding cylinders. Some holes must be aligned vertically and others horizontally.

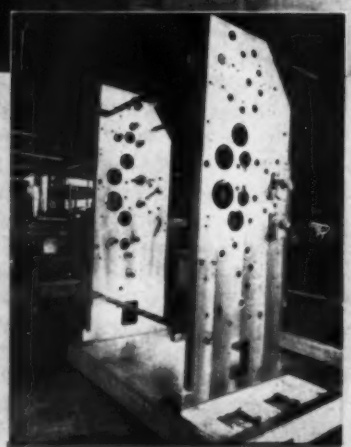
**THE SOLUTION**

Mount pair of side frames, 5/8" apart, on table of 4" Bullard H.B.M., Model 75, equipped with automatic table and head positioning. Bore all holes of the same size beginning with the largest and working down to the smallest.

**THE ADVANTAGES**

All related holes in perfect alignment — no spoilage. Less tool change-over time.

Eliminate hand measurements and templates for hole location. Accurate automatic hole location within a tolerance of ±.0004". Ease of operation from Pendant Control — less operator fatigue. Overall boring time reduced 25% over previous method.



Partially assembled side frames ready for ink rollers, gears and printing cylinders.

How about your boring problems? Are you applying all the advantages of a Bullard H.B.M., Model 75 to them? If not — get the full story from your nearest Bullard Sales Engineer or write

# THE BULLARD COMPANY

**BRIDGEPORT 9, CONNECTICUT**

# DETROIT... TRENDS

## Is the auto slump over?

For no single apparent reason, automobile sales are picking up. Mercury, as hard hit this year as any make, reports with some surprise that the last 10 days of July were the best 10 days it has chalked up in the last 11 months.

**Other makers report sales increases** anywhere from 12 to 36%. And a sampling of managerial opinion indicates that Detroit's slump is over.

**Just why the same car that didn't sell all year** should start moving now is a good question. Each company has its own answer.

**Reasoning varies** from crediting a direct mail campaign to figuring the sales upswing to be an indirect blessing of the Mid-East Crisis.

**But prosperity returned too late** to help 1958 model schedules. Only 170,000 cars will be built in August, and some of these will be 1959 Buicks.

**However, fourth quarter goals have been raised** about 10% to nearly 1.4-million units. A serious shortage, rather than a cleanup problem, is expected during the changeover period.

## Skeleton in the closet . . .

No one in Detroit, from Harlow Herbert Curtice on down to the accountant sweating out the price structure on the new Buick LeSabre, can plan with any certainty until Walter Reuther is heard from.

**The UAW Executive Board** went through the motions of deferring action on strike votes taken August 9 by the UAW Chrysler, Ford and General Motors councils.

**This was a precedural maneuver** that legally set the stage for a strike without committing the time.

**Reuther does not seem to want a strike.** But neither for prestige reasons can he afford to accept the only offer made him so far; namely, a two year extension of the previous contracts.

**Though Reuther has publicly emphasized** his more dramatic profit-sharing scheme, and from time to time will spotlight isolated demands (his total package fills a printed book four inches thick) in speeches to those affected, it is certain that he would be very glad to settle for: a productivity factor closer to 3.9% than the present 2.5%, extension of supplemental unemployment benefits from 26 weeks to a year, and pensions tied to the cost of living.

**The industry feels that such a "compromise"** would cost about 21¢ an hour. It figures out this way: The hike in the productivity factor is worth 3¢ an hour; extending SUB may mean a new pickle as the plans are already fully funded and the companies are no longer paying into them; and finally, escalating pensions would cost about 13¢ an hour. However, the union claims that the last two items would actually cost nothing.

**Reuther is not likely to get such a package.** In fact, the Big Three are adamant in offering nothing except contract renewals, and they are united in this stand. Such unity has no previous precedent in the history of auto industry-labor relations.

**As of now,** negotiations are completely stalemated. One can hardly bargain when there is no give or take. Time favors Reuther and so does the recent upturn in sales. He is stalling for the vulnerable moment when 1959 model production gets into high gear.

## Ford the strike target?

The cold tactical fact facing him is that his strike fund now is around $40 million. This would finance a five-week strike against GM, and double that time against Ford. Chrysler is not a likely target, because a strike there would be mutual suicide. The economics point to Ford.

**This leaves the big question:** What will GM and Chrysler do if Ford goes down? There is considerable doubt as to the legality of a shutdown in sympathy. Not much could be done, though, if these companies decided on token production with attendant mass layoffs.

**Reuther's timing** hinges on Ford model changeover plans. Currently, Ford Division is scheduled to shut-down around September 1 for two weeks.

**If Ford is really the target,** the last two weeks in September will make labor headlines. On the other hand, if Reuther goes for broke against GM, the timing will still be the same. Chevrolet shutdown August 15 and won't reopen for a month.

**Only one thing is certain**—Something has to happen. From here, it looks more like strike than at any time since negotiations started last March.

## Chrysler-Simca Again . . .

This column may have erred in intimating that Chrysler's forthcoming small car will be built by Simca of France. It now appears that the car will be ready for production by mid-1960 and existing Chrysler facilities in this country will be utilized.

PRODUCTION MACHINERY

# GREENLEE

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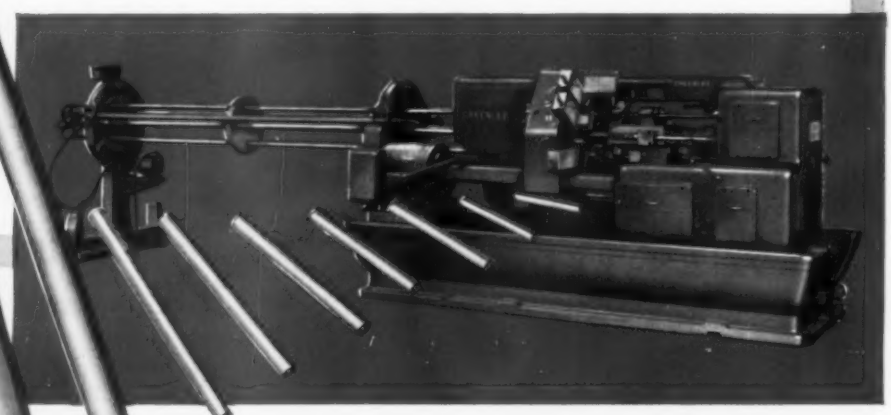

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# AIRCRAFT and MISSILES... TRENDS

## Those local taxes...

Justice Department has begun wide-ranging legal action on behalf of aircraft, missile, and other defense contractors recently hit by a wave of tax suits by state and local governments. The growing volume of new tax claims stems from the Supreme Court's March decision that federal-owned property used by private companies for profit is no longer immune from local taxes.

**One of the major cases** which the Justice Department has entered is pending before the Supreme Court of California: a suit by Los Angeles County against Aerojet-General and Convair to tax inventories and tools owned by the Air Force. The case is scheduled for argument within two months.

**Justice and the two companies** won the three-year old case in a lower court. But in view of the Supreme Court's March ruling, the county government has appealed to the higher state court. If the county wins the case, the Justice Department estimates, the tax principle would be extended to all Air Force contractors in the Los Angeles area at a cost of over $40 million to the government.

**Similar cases are pending** against Boeing in Kansas and The Martin Co in Maryland. The Justice Department has braced itself for still more suits from city and state governments that claim real property and personal property tax payments from defense contractors on land, buildings, and materials in the contractors' hands but owned by the Defense Dept or AEC.

**Washington's concern over the issue is obvious:** Under provisions of most defense contracts, the contractor can pass on the new costs to the government. Pentagon lawyers estimate that the extra cost would be as high as $250 million a year just to cover personal property taxes on military-owned inventories.

**Justice and Pentagon lawyers** see enough "gray areas" in the Supreme Court's March ruling, however, to justify a fight against the local tax authorities on behalf of defense contractors.

**Their argument is based on the concept** of "beneficial use"—that is whether the contractor-used, government-owned property is being employed to benefit the private company or the US government. As the federal lawyers see it the Supreme Court's decision implied that in cases where the sole beneficial use can be proven to be the government's, the property continues to be immune from local taxation. Presumably, if this cannot be fully justified, the government will not step in on the contractor's side.

## What about the small sub?

Full utilization of small plants is essential to all-out national defense production, H J Peterson, executive VP of Topp Industries, Los Angeles aircraft and missile manufacturer, recently told a Congressional Small Business Committee.

**The role of the small plant must be reassesed** and the government must change its policy of dealing with them, he said.

**Small defense contractors,** he said, are up against six tough problems:

- High cost of quantitative reliability.
- Unavailability of government facilities for small industry.
- Procurement problems caused by advertised bid procedures.
- Manpower mobilization by small industry.
- Financial difficulties of small contractors.
- Security and marketing restriction.

**What can be done about it?** Peterson recommends that the government undertake:

**(1) A comprehensive analysis** of small firm facilities and dissemination of such information to major contractors.

**(2) A more equitable arrangement for financing** the work of small but worthy firms, which lack working capital and need prompt payment for their work. SBA loans take too long.

**(3) Elimination** of some of the unwieldy restriction on information would help engineering and production management to plan work more intelligently and would aid national security.

**(4) Pay more attention to quality control** and reliability studies. In many cases this can cost more than the product, but testing of prototypes is absolutely essential. Because the small defense contractor doesn't have the means to test his product, the government should make such testing facilities available to him.

## Industry briefs...

Charleston, S C, will soon get a multi-million-dollar Polaris missile base . . . Four major subs have been picked for the Pershing ballistic missile—Thiokol Chemical (solid-fuel rocket engine); Bendix Eclipse Pioneer Div (inertial guidance system); Bulova Watch (fuzing and arming); and Thompson Products (launcher vehicle) . . . Air Force and Curtiss-Wright are putting some $4 million worth of machine tools and equipment on the auction block at Garfield, N J , and Clifton, N J, August 26-27 . . . Lockheed-Burbank has a new $22 million Navy contract to build 26 P2V-7 Neptune antisubmarine plane, extending production through Sept 1960.

# Lodge & Shipley POWERSHIFT PRESELECTOR GIVES PRODUCTION PLUS

- **TIME SAVING** . . . by eliminating "compromise speed setting" which can waste up to 50% of machining time.
- **INCREASED TOOL LIFE** . . . by using proper cutting speed. You save both tool time and money.
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- **PROVISION FOR THE FUTURE** . . . POWERSHIFT can be adapted for electronic programming or magnetic tape control.

**A SINGLE DIAL . . . COMPUTES! REMEMBERS! SHIFTS!** You merely rotate cut speed dial to desired speed (dial computes speed if desired) . . . then, when preset speed is needed, shift to it immediately at the apron! One speed can be preset; up to six others "programmed" with handy indicator tabs. A Lodge & Shipley representative will be glad to explain fully. You'll find his name in the telephone yellow pages. Or, for detailed literature, write: **THE LODGE & SHIPLEY CO., 3056 COLERAIN AVE., CINCINNATI 25, OHIO**

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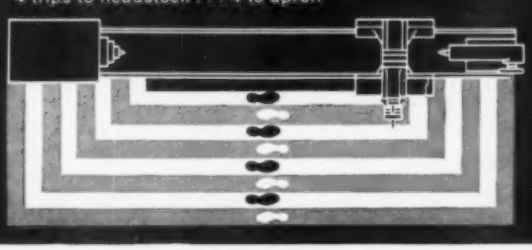
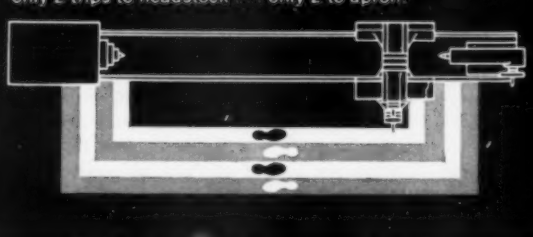
4 trips to headstock . . . 4 to apron



POWERSHIFT PRESELECTOR . . .
only 2 trips to headstock . . . only 2 to apron!



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# MACHINE TOOLS... TRENDS

## Summer yields little business...

Net new orders for cutting type machine tools declined in July to $21 million, from $23.5 million in June. Total for the first seven months of 1958 was $160.8 million. This compares with $371.6 million in the same months of 1957.

**Vacation shutdowns had a severe effect** upon shipments of cutting type machine tools in July.

**The month's total dropped to $22.7 million** from $35.3 million the previous month. Shipments from January 1 to July 31 amounted to $267.9 million. In the corresponding period of 1957, shipments ran to $551.3 million.

**Orders for forming type machine tools** also fell in July to $7.5 million from $9.1 million in June. Shipments tumbled to $7.9 million, against $10.1 million the preceding month.

**A quick check in the machine tool industry** confirms the fact that August sales are not much better, if any, than July. This is no surprise, as builders felt all along that the summer months would produce relatively little business.

**The industry looks for** mild improvement in September.

## Embargo list still big...

The revised list of machine tools still embargoed for shipment to Russia, China and other Communist countries from western Europe is larger than anticipated.

**The list was agreed upon** after weeks of negotiation in Paris by COCOM. It represents a substantial concession by Washington to our associates, since many types of machines have been removed from the list.

**These types of machines cannot be shipped** to the East: Machines, apparatus and tools specially designed for boring and turning gas turbine compressor cases and discs; for making or measuring gas turbine blades; for grinding rotors; and for surface broaching blades and discs.

**Also deep hole drilling and trepanning machines** and tools; generating-type gear grinders for work 36 in. in diameter and over; all classes of gear cutters and finishers for gears with pitch finer than 0.5 module; internal grinders, heads and spindles operating above 80,000 rpm.

**Also jig grinders and borers** with traversing motion exceeding 44 in. in any direction; all classes of machines with electronic closed loop feedback controls and control accessories.

**Also traveling head millers** for milling aircraft spars; all machines to work or form aircraft sheet, plate or extrusions.

**Also spinning lathes** with spindle-drive motors over 25 hp; hydraulic and mechanical presses with total rated pressures above 5000 tons.

**Also all machinery,** machine tools and apparatus specially designed to produce, test, research into and develop any military aircraft, arms, missiles, ammunition and vessels of war (including tele-control and tele-metering equipment for aircraft and missiles).

**Also horizontal impact hammers** hydraulically actuated at 10,000 foot-pounds or more; counterblow hammers rated at 180,000 foot-pounds or more; and other forging hammers rated at 10 tons or more.

**Machines not on the above list** may be freely exported by western European builders. No longer is there a list of machines subject to quantitative control. This relaxation is the result of pressure brought by the COCOM group on the United States.

**A separate embargo list,** more extensive than the above, has been prepared by Washington to apply to shipments by U S builders. This list will not be made public. Each deal will be treated as a separate transaction and the builder will not know what can or cannot be shipped until he applies for an export license in Washington.

## Sheldon lathe at $2350...

Low-priced foreign-built machine tools have been and still are cause for concern to U S builders. How to compete is the problem.

**Sheldon Machine Co Inc, Chicago,** is meeting the problem head on by developing a new 15-in precision lathe to fill the gap between conventional belt-driven and geared-head lathes. This lathe is now ready to be marketed at a base price of $2350.

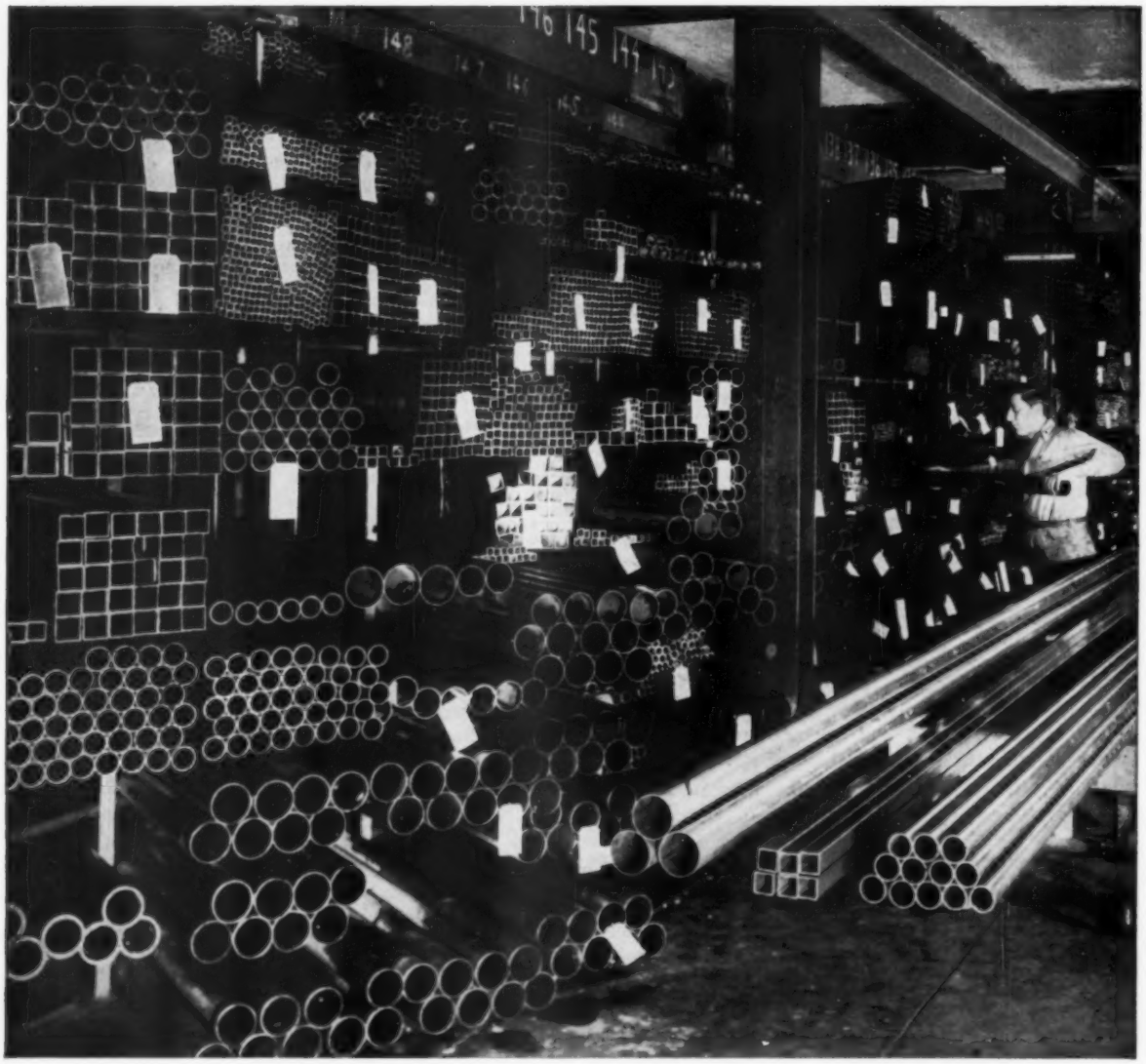
**The new machine,** so the company states, combines the capacity and power of a geared head with the economy and flexibility of a belt-driven lathe.

**The fully enclosed headstock** probably is the most significant design feature of the machine.

**Low price is made possible** by the unusual simplicity of the patented headstock and drive, Sheldon states. This same design simplicity also enables the machine to furnish maximum power to the spindle.

**Sheldon feels that the new lathe is priced** so that users will buy it despite depreciation reserves that suffer from antiquated depreciation policies of the federal govrenment.

BF



# The type of tubing you need is here

It pays to analyze your tubing requirements with a Ryerson tubing specialist. He is well qualified to help you select the right tubing for your purpose from Ryerson's diversified stocks.

The Ryerson specialist knows tubing—knows what will work best and why. In many cases, he can recommend a type that will do a better job for you—perhaps a newer type that will save you money, either in first cost or in the cost of using it.

Ryerson carries the nation's largest stocks of steel tubing—all of certified quality—and uses the finest modern equipment to cut to your exact specifications. And Ryerson delivers fast—one tube or a thousand.

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# MATERIALS... TRENDS

## Bacterial inhibitor . . .

Shop evaluations recently completed by Eli Lilly and Co indicate that its new bacterial inhibitor, Elcide 75, will extend the life of soluble-oil emulsions at least two to four times. Recommended use is one ounce of inhibitor in four gallons of fresh emulsion.

**In one shop evaluation,** Elcide 75 (thimerosal and sodium-O-phenylphenate, Lily) was added to the 40:1 emulsion in 11 machines including lathes, grinders, and drillpresses. The machines were not cleaned prior to filling with the new emulsion, which was usable for 22 weeks without separation or odor. Normal usage, without the inhibitor, was four weeks.

## Stainless-steel honeycomb . . .

"Temcombing" is a continuous process for fabricating stainless-steel sandwich developed by Temco Aircraft Corp. The process has a brazing cycle time of three to 20 lineal ipm, depending on panel thickness, and will produce panels up to four feet wide and ten feet, or more, long. It eliminates large, expensive furnace installations and carbon die blocks.

**Because equipment is fully automated,** cost of panels produced by this method will be substantially lower than those previously available. In this process, panels are simultaneously brazed and heat treated; are produced in single curved contours with ease and can be provided as moderately contoured double-curved panels.

## More oxygen and nitrogen . . .

Designed to serve users within a 300-mile radius of Kansas City, a new oxygen and nitrogen producing plant is being built by Air Reduction Sales Co, a division of Air Reduction Co, Inc, in the Armourdale district of Kansas City, Kansas. Plant will have a monthly capacity of 5 million cu ft of oxygen for industrial as well as breathing purposes. It will also produce high-purity nitrogen.

## Ceramic survives 5000 F shock . . .

Now being evaluated by the USAF and by Redstone Arsenal, a new ceramic developed by Boeing and called *Galceram* can be heated to 5000 F and plunged into water without shattering, or even cracking. Its strength persists through both rapid and gradual temperature changes.

**Galglass is another development** of Boeing's Plastic Group, at the Wichita division, for possible use on nuclear powered aircraft. Galglass would be useful wherever transparent shielding is needed. It reduces the effect of radiation and has normal strength, appearance and usefulness of conventional glass.

**Joe Galli, supervisor of the group,** also has a patent pending on the composition and process for a non-blistering chemical paint which is said to combine with the surface being painted. It will be useful for a variety of surfaces, including metals and textiles.

## Pink gold . . .

Interiors of the new Douglas DC8 luxury airliners will be decorated in pink gold, designed by Raymond Loewy and Associates. Developed and produced by Anadite, Inc, South Gate, California, gold-anodized aluminum will be used for panels, seat trim, ash trays and all other aluminum harware parts of the interior. Parts are individually color matched in a color-matching machine under absolute daylight and twilight conditions. For proper color control, 18 solutions are used.

## Electroluminescence . . .

The glowing-panel area source of light created by activating a chemical-phosphor coating with an alternating electric field, will be used for dashboard lighting in one of the Big Three 1960-model automobiles. Cost is down, says supplier, to about $3.50 for a metal-based, 4 by 6-in. panel and may be under a dollar for quantity production.

## To prevent abrasion of glass . . .

A new silicone surface treatment developed by Donnelly-Kelley Glass Co, Holland, Mich, is said to be highly effective in preventing dust accumulation as well as for abrasion resistance. Useful anywhere where repeated cleaning of glass parts is involved, it may ease maintenance of tool-grinder guards, instrument windows, and the windows in sandblast or sterile hoods.

## Missile-maker's steel . . .

Airsteel X-200 is the laboratory name given US Steel's new low-alloy, workable, air-hardening steel. Developed to ease manufacturing problems in the missile industry, new alloy provides 280,000 psi tensile strength. More details are given on page 72.

# PAID OFF in 13 weeks

**JOB:** Smoothing edge of plate after flame-cutting. Grinding time with tool formerly used—*2 hours.* Rotor Application Engineer recommended the *right tool*—a Rotor B-7SS* Vertical Grinder and Sander.

**RESULT:** Grinding time now 1½ hours—a savings of $20.25 per 40-hour week. Fast, light (6¾ lbs.) Rotor B-7 gives better finish, reduces operator fatigue.

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CLEVELAND, OHIO

# WHAT'S AHEAD... in Metalworking

TRENDS

## Machinery, durables outlook improves...

Increased orders for both consumer goods and industrial machinery have helped to generate a better feeling in important segments of the metalworking industry.

**Lately, bookings have risen** in engines and turbines, pumps and compressors and office machinery. Construction and mining machinery demand has been above that of a year ago.

**Automobile sales** have unexpectedly been looking up. Ford's recall of workers at Cleveland will bring its total employment there to 12,100, compared with last year's peak of 14,000.

**Parts orders placed by Detroit,** on the other hand do not give cause for undue optimism. They are in smaller volume than they were a year ago.

**Now that some auto companies** have made initial purchases of steel to cover new model needs, steel orders from Detroit probably will be on the lean side until the sales outlook clarifies and the strike threat ends.

**August steel orders are not as strong** as they were in June, but they are better than July's and should improve month by month.

**Steel price rise has had practically no effect** on the market. For one thing, it was small. For another, customers have exhausted their inventories and must buy for current use.

**Demand is steadying for gray iron castings.** Latest figures show operations at 52.7% of maximum demand, compared with 52.3% for a month earlier. Shipments have moved up steadily since February's low.

**Steel castings producers** have increased their operating rates, too, from July's 26.5% of maximum demand to 30.5% in August. Bookings, however, have fallen off in that time about 5%.

**Major appliance outlook has definitely improved** in recent weeks. Washer and dryers, refrigerators and freezers, and gas ranges are moving well—electric ranges not so well. The appliance industry is generally optimistic about fall prospects for all lines.

**Those stamping firms** that supply the electronics and television industries report a decided pick-up in recent weeks. Some stampers anticipate that business will be 50% better in the last half of 1958 than it was in the first half.

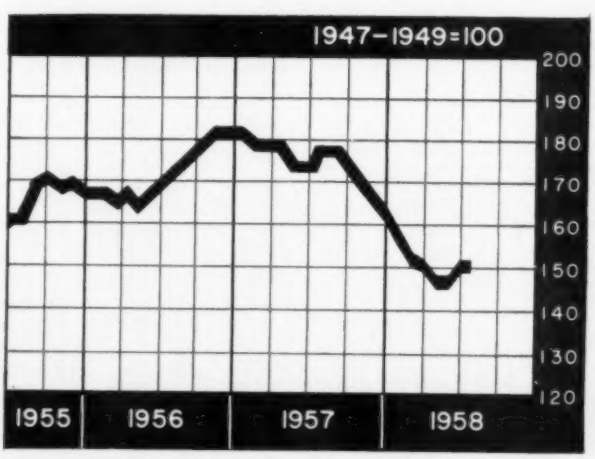
**Other stamping jobs shops** are still finding business very spotty. Many shops have had designs and tooling ready for months but can't spring orders loose from industry. Now, if delayed orders were to come in all at once, stamping shops would be jammed, and production could be seriously delayed.

**Backlogs continue to decline** in the tool and die industry. New orders are reportedly at the lowest point in recent years. Shipments have been rising, but new orders have not kept pace and backlogs are dropping fast.

**Tool and die employment,** too, has declined something like 5% a month, and number of hours worked is off nearly 9%.

**Farm machinery,** after a long period of depression, is coming out of its slump with a bang.

**One major farm equipment manufacturer** reports its industrial and earthmoving equipment sales right now are running more than 100% ahead of a year ago—and sales for the year are expected to wind up somewhere around 30% higher than those for 1958.




151

**AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION**

**BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS**

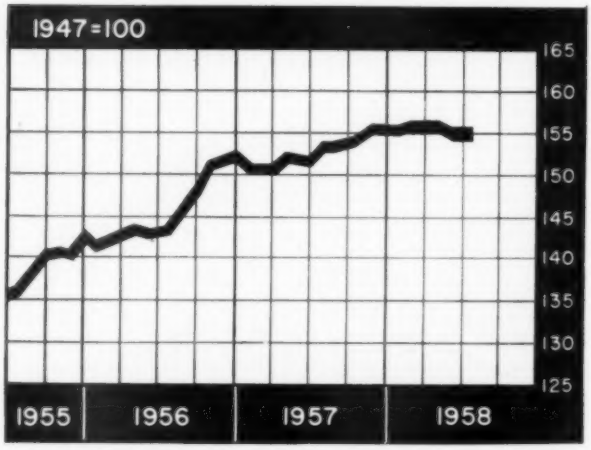
| | JULY Estimated | JUNE Preliminary | MAY Revised | JUNE Year Ago |
|---|---|---|---|---|
| **Total Index** | **151** | **151** | **148** | **177** |
| **Machinery** | **125** | **123** | **151** | |
| **Electrical Machinery** | **174** | **167** | **210** | |
| **Autos** | **89** | **90** | **120** | |
| **Other Transportation** | **350** | **340** | **376** | |
| **Other Metalworking** | **131** | **126** | **145** | |

# TRENDS WHAT'S AHEAD... in Business

**AMERICAN MACHINIST INDEX OF METALWORKING PRICES**

| | JULY Estimated | JUNE Preliminary | MAY Revised | JUNE Year Ago |
|---|---|---|---|---|
| **Total Index** | **155.9** | **155.9** | **155.8** | **151.9** |
| **Metalworking Machinery** | | **181.1** | **181.1** | **176.9** |
| **Other Machinery exc. Electrical** | | **166.0** | **165.8** | **160.8** |
| **Electrical Machinery** | | **158.8** | **158.5** | **154.3** |
| **Fabricated Metal Products** | | **146.3** | **146.4** | **143.2** |

155.9




## Silver lining in the profits overcast...

Corporate profits—or the lack of them—form a lugubrious chapter in the business story this year. Earnings in the first half were down over 30% compared to the first six months of 1957.

**The precipitate earnings decline** has hit almost all industry groups. In manufacturing, only food, drink, tobacco and drug manufacturers enjoyed higher first half profits this year—proving, if nothing else, that recession or no recession, people continue to eat, drink, smoke and ail with undiminshed energy. Outside the manufacturing category, only utilities and wholesale and retail trade corporations registered year to year gains in profits.

**According to the First National City Bank's** survey of leading corporations, profit shrinkage was most severe for the following groups: railroads, automobiles and parts, iron and steel, textiles and apparel, and mining and quarrying.

**Despite tumbling earnings,** though, dividends have been maintained at the 1957 level. The result: retained earnings have sunk to their lowest point since 1940.

**There is a silver lining** in the profits overcast, however. Early reports indicate that second quarter earnings were slightly above those for the first three months. For instance, of the 22 industry groups covered by the First National City Bank, 15 had higher profits in the second quarter than in the first.

**Only a few months ago,** all signs pointed to a continuation of the profits plunge through and beyond the second quarter. Thus, while slight, the improvement in profits—along with other encouraging business news—should have a tonic effect on business confidence. And a perkier attitude on the part of businessmen should prevent further cuts in their investment plans.

### WEEKLY BUSINESS INDICATORS

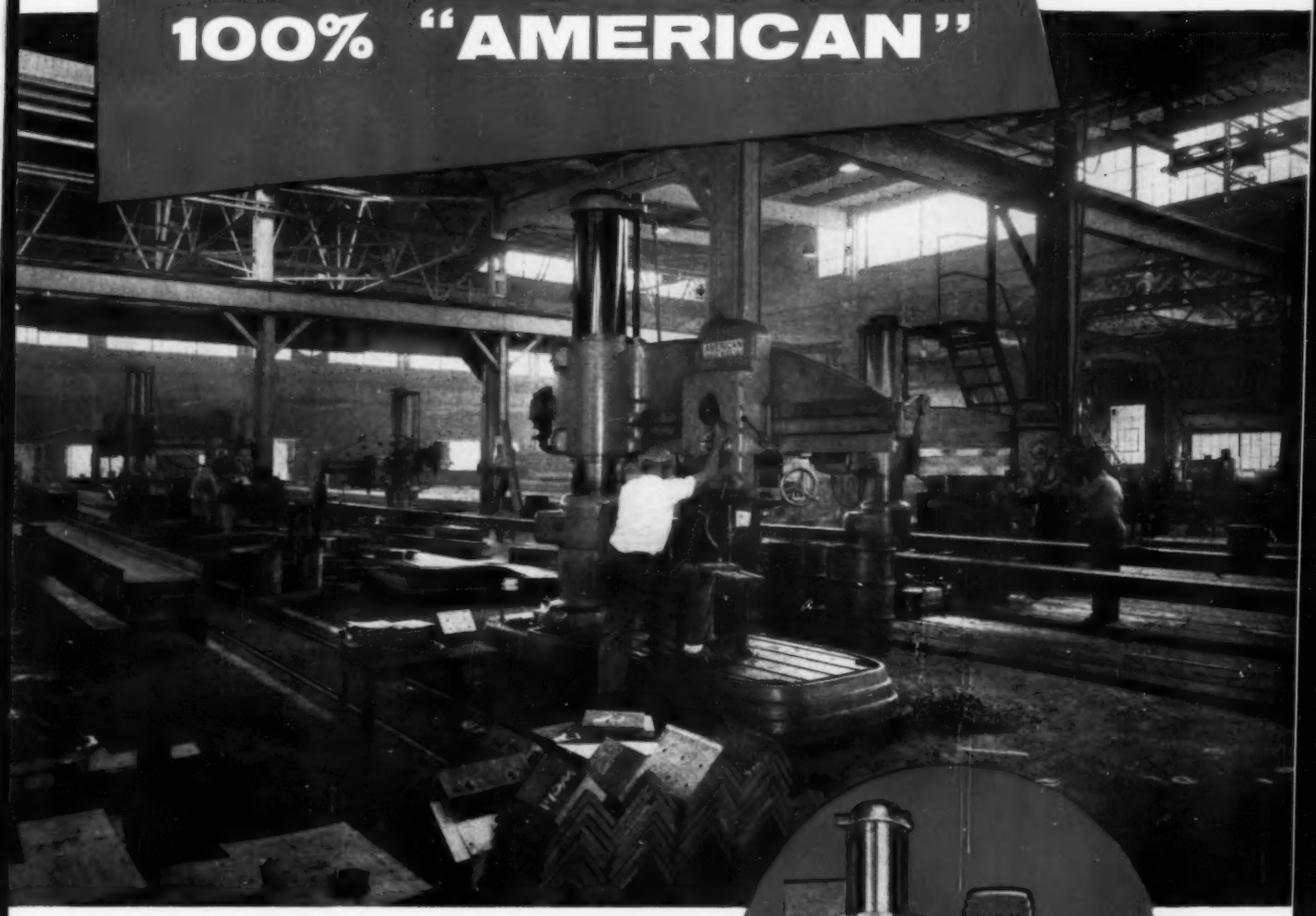
| | Latest Week | Preceding Week | Year Ago |
|---|---|---|---|
| *Business Week* Index of Activity (1947-1949=100)* | 137.5 | 137.6 | 144.9 |
| Steel ingot operation (thousands of tons) | 1,656 | 1,586 | 2,062 |
| Electric power output (million Kilowatt hours) | 12,707 | 12,619 | 12,070 |
| Production of automobiles and trucks | 81,443 | 80,374 | 137,143 |
| Engineering construction awards (Eng. News-Record, millions) | $336.9 | $514.0 | $411.9 |

### MONTHLY BUSINESS INDICATORS

| | Latest Month | Preceding Month | Year Ago |
|---|---|---|---|
| Index of industrial production (1947-1949=100)* | 133 | 131 | 145 |
| Index of durable manufactures production (1947-1949=100)* | 141 | 139 | 162 |
| Durable goods manufacturers' sales, millions* | $12,025 | $11,643 | $14,207 |
| Machinery manufacturers' sales, millions* | $ 3,760 | $ 3,736 | $ 4,259 |
| Durable goods manufacturers' new orders, millions | $11,785 | $11,423 | $13,249 |
| Machinery manufacturers' new orders, millions | $ 3,521 | $ 3,690 | $ 4,103 |
| New Orders for Nonelectrical Machinery (1950=100)* | 138 | 129 | 144 |
| New Contracts for Industrial Construction (1950=100)* | 109 | 87 | 134 |

* Seasonally adjusted

# 100% "AMERICAN"



The Stupp Bros. Bridge and Iron Company of St. Louis, Missouri, known the country over as one of the leading structural steel fabricators, use "AMERICAN" Radial Drills exclusively.

Mr. Erwin P. Stupp, President, gives as his reasons for his continuous selection of "AMERICAN"—

- EASE OF HANDLING
- RIGIDITY
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These factors combined with the extra power offered by "AMERICAN" Hole Wizard Radials guarantee a handsome return upon the user's investment.

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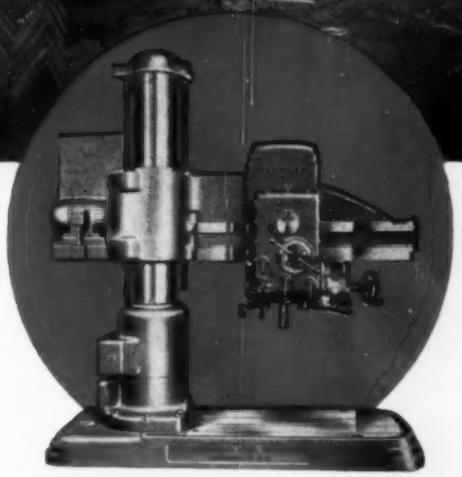

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Here are some of the many advantages of H-P-M's new DIAFORM press: Twin table tops are flat for loading and unloading dies. Operator has easy access for hand work on parts . . . The entire table surface is a working area . . . There is practically no restriction where form blocks of various heights are placed on the table . . . It's impossible to "stick" a work loading table in the press due to misplacement of form blocks or throw pads . . . The pad facing is 6" thick — an important factor to insure conformity of the upper radii of the formed part to the radii of the form block. This results in minimum wrinkling . . . Work is raised to the level of the rubber pad rather than deforming the pad to reach the position of the work. Less deformation of the pad results in longer wear and better service.

Investigate what the H-P-M DIAFORM press will do for you. Write today.



Typical irregular aircraft parts formed on the H-P-M DIAFORM press.

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HPM

American Machinist
MAGAZINE OF METALWORKING PRODUCTION • ESTABLISHED 1877

# Necessity—Not Expediency

More liberal depreciation of capital goods is not a tax relief gimmick.

Advocates of speedier writeoffs have in mind only one major objective—to permit industry to recover much more quickly than is possible today the dollars invested in new plant and equipment.

## Why, you ask? . . .

Because statistics show that in recent years corporate depreciation reserves have been the source of about half the funds spent for capital goods. Unless spending for new plant and equipment continues at a high level, our economy will suffer from high costs, inefficient operations and inability to take advantage of new technological developments.

There are other sound reasons for Congress to do a thorough job of revising tax depreciation policy onto a more realistic basis.

New processes and new machines, designed to use automation to maximum profit, are being perfected and offered on the commercial market at the fastest rate in history. Because one new process is hardly installed a decent time before a still newer process obsoletes it, the useful life of production equipment is much shorter than it used to be.

## Chrysler is a shining example . . .

It recently scrapped nearly all the machine tools in an entire engine plant because they had become obsolete. Only six years ago that installation was the most advanced and highly automatic of its kind in the automobile industry.

Yet nowhere in the Treasury Department's depreciation rules is there a glimmer of recognition of this technical revolution in industry. Bulletin F, not yet disclaimed as the bible of revenue agents in determining the life span of equipment for writeoff purposes, is a living reminder of the federal government's antiquated thinking.

Unfortunately the 1958 Congress has done no more than make a feeble gesture in the direction of depreciation reform. A bill recently passed the House permitting faster writeoffs on capital goods up to a maximum of $10,000 bought in any one year. The depreciation provision was only incidental to the prime purpose of the bill—to afford tax relief to small business. The bill was based on political expediency and bore no relationship to any desire to institute badly needed reforms in depreciation policy.

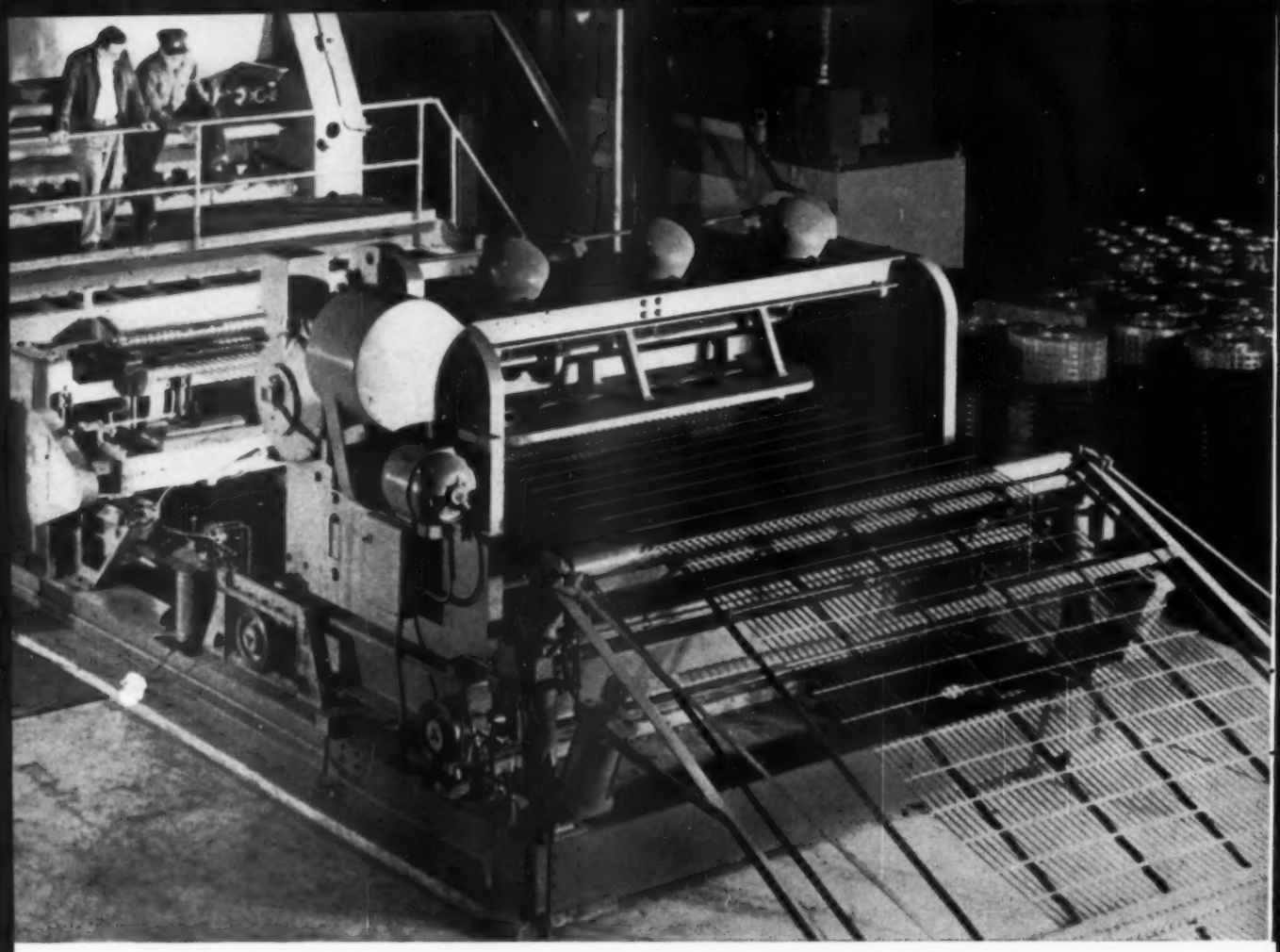
## Tax relief and . . .

sound, realistic depreciation policy on capital goods have nothing in common. That fact should be driven home to every member of Congress.

At the same time every Congressman and Senator should be fully briefed on the necessity for speedier writeoffs of investments in capital goods.

A realistic depreciation policy, as the Machinery and Allied Products Institute so aptly puts it, is "inextricably intertwined with sound federal tax policy, indeed, with our national security." And an immediate major overhaul of the tax structure, of which realistic depreciation is so vital an element, is imperative if our economy is to be healthy and is to grow vigorously.

Burnham Finney EDITOR



# Cincinnati Shear cuts wire mesh at Pittsburgh Steel

The Cincinnati Shear shown is part of an automatic wire welding machine at Pittsburgh Steel Company, Monessen, Pennsylvania. The machine produces wire mesh and fabric used for concrete pipe, buildings, and other applications. The photograph shows the shear cutting forty-seven 2/0 gauge (.331″) wires per stroke. The wire is low carbon, cold drawn steel. Other jobs require shearing mesh with wires up to ½″ diameter. This shear was specially engineered for this type of application. Because cuts are heavy and production is continuous, Cincinnati dependability is essential.

Standard Cincinnati Shears offer such productive features as powerful hydraulic hold-downs, all-steel interlocked construction, and one-clearance shearing of different metal thicknesses.

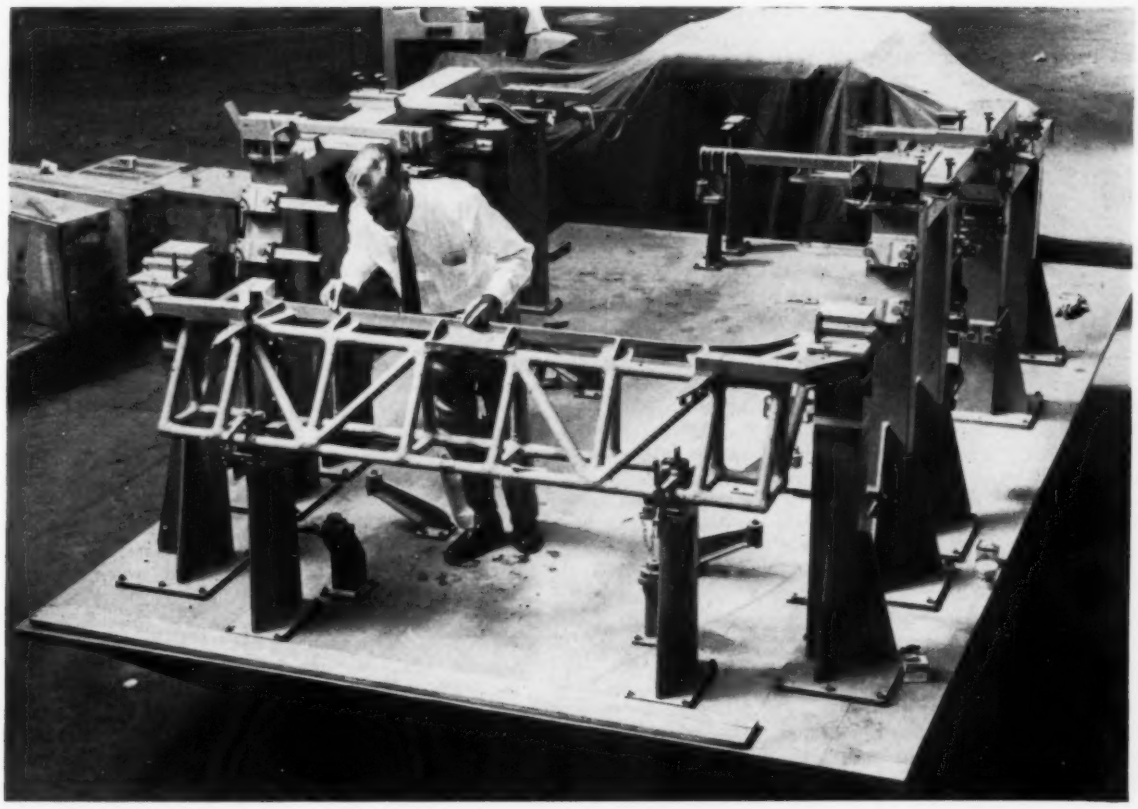
Write Department A for Shear Catalog S-7R.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio

CIRCLE 259 READER SERVICE CARD



**Body checking fixture . . .**
. . . can handle eight bodies a day, instead of the several days required for a highly skilled layout man to check just one body. This important quality control device spot checks linear dimensions of the Imperial body shell, which is placed in center of fixture as gages record body dimensions

## *As production starts at Chrysler's re-done Imperial plant . . .*

# Quality control rules the roost

**Quality is the watchword at Chrysler's newly renovated and equipped Detroit plant, where every stage in production of 1959 Imperials is closely controlled. The plant, which once produced other Chrysler cars, is today devoted exclusively to output of Chrysler's top lines—the Imperial, Imperial Crown and Imperial LeBaron. Production started at the revamped plant August 11.**

### 1-Million-Sq-Ft Plant

The new facility covers more than 1-million sq ft, houses something like four miles of conveyors, six paint ovens, 11 miles of paint pressure lines, and keeping a close check on the whole operation, 32 inspection stations. Tooled to produce 27 cars an hour, with almost any combination of optional equipment items (the air-conditioning unit installation line, for instance, can equip 100% of production with units if necessary), the plant has about 100 quality control people spotted at the 32 stations, operating one of the latest statistical systems in the auto industry. The system is based on four points:

- Fact gatherers on the production line continuously gather information pertaining to quality of product.
- Facts are fed to a control group of analytical engineers, who analyze and chart overall quality trends.
- Analytical engineers interpret quality trend figures, then feed back corrective-action recommendations to pinpointed production or pre-production areas.
- 100% station inspection—detection and immediate correction of quality defects as they occur on the assembly line.

Feed back of information is in the form of daily quality control charts sent to line foremen. In addition, hourly quality control tabulations are maintained for greater quality accuracy. To help the quality control group carry out its assignments, a variety of checking devices are located along the assembly line. These include:

### Master Fixture Makes 100 Checks

- An "R-1" master body checking fixture designed to spot check bodies for dimensional accuracy and to indicate to quality men if dimensional adjustments are needed. Over 100 body dimensions are checked at 30 critical points by this master fixture.
- A variety of plastic "plugs" or templets (made to the exact dimensions of windshield, back window, and door openings) are fitted into body-shell openings during pre-assembly to determine accuracy of dimension.
- A static water-test booth (located near the final assembly line) spot checks the efficiency of the water-

test booth, which is located on the final line.

- The "hot room," where temperature and humidity are accurately controlled to check on the efficiency of operation of air conditioning units under widely varying temperature conditions.
- An automatic leak detector or "sniffer" (an electronic device that detects refrigerant leakage in air conditioning unit lines) allows proper line adjustments to be made easily to correct any leakage.
- A power steering checking fixture which determines proper centering and evenness of torque of the power steering unit.
- A front end and height alignment fixture in which each car is checked for front wheel alignment, and for proper height, front and rear.

In addition, incoming Imperial parts and materials are rigidly regulated through modern quality control procedures.

### Automatic Pairing Unit

Among many new manufacturing devices at the Imperial plant is a static body control switching system designed automatically to assign a proper body to its companion chassis as both components move toward final assembly.

The system works this way: a master control panel located along the assembly line monitors six body feeder lines. As the chassis moves down the line, the bodies (which have been previously arranged in proper scheduling sequence) are automatically selected from one of the feeder lines and placed on proper chassis. Pinpoint body spacing thus eliminates congestion of work load in any one area along the body-drop portion of the line.

### Heavy Rainfall Test

A "rain-storm in a box," designed to check body water tightness, is another production innovation at the Imperial plant. Located on the final assembly line, the 25-ft-long water test booth is equipped with 118 jet nozzles, 22 of them directed to the underside of the vehicle.

These nozzles pour a deluge of recirculated water onto each assembled car. The volume of water released during the test period is equivalent to a rainfall of 252 in. per hour.

One of the first high-speed 180° conveyor turns to be installed in an automotive assembly plant is also part of the new Imperial facility. The actual rate of speed of the specially constructed conveyor is about 13 times as fast as the main conveyor line.

Purpose of the high speed on turn is to eliminate blocking of plant supply routes by assembly line units. This special conveyor has a separate drive element, and a compensating drive clutch to enable it to perform its precise task.

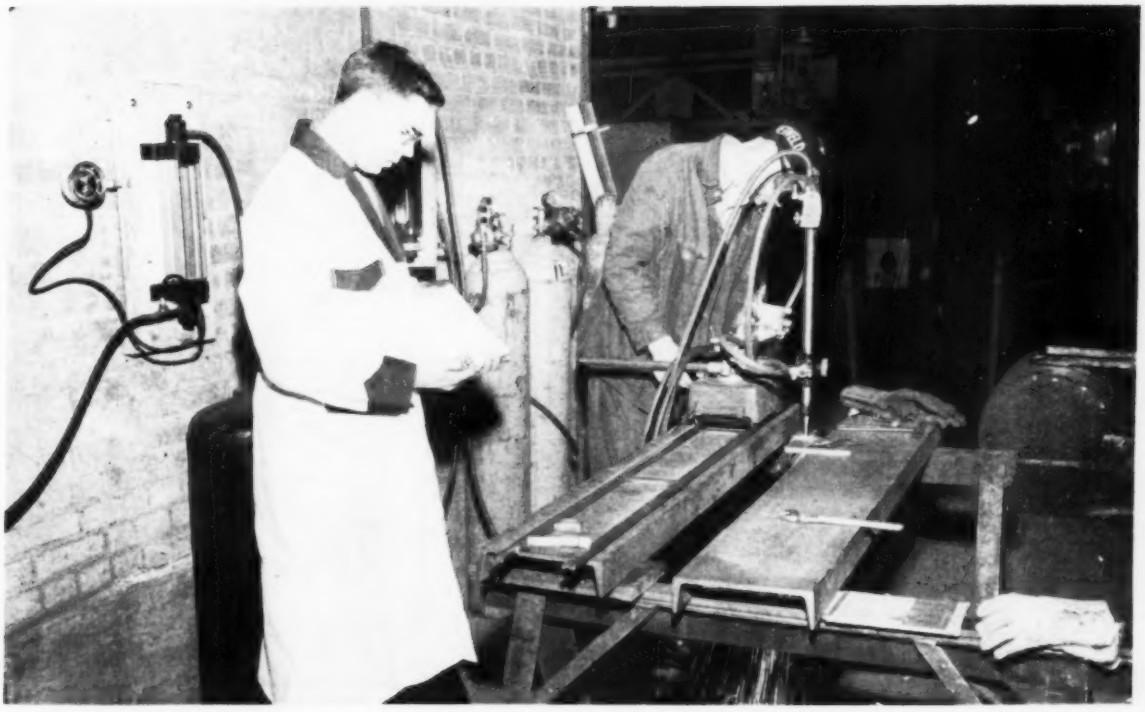
To maintain a dust-free atmosphere in the paint area, more than 1,500,000 cu ft of air per min is sucked into an air filtering center through 14 air supply houses on the top of the building. The "raw" air is first forced through a large mesh screen with ½-in. holes to eliminate large foreign matter. It is then passed over fixed louvres (which keep out rain and snow), is pre-heated by a series of burners, and is directed over a series of spray nozzles. The water spray wets down to eliminate heavy floating dirt particles.

Next, the air passes through a roll filter, which eliminates more particles, is re-heated to a temperature of 78 F. The air is then blown into a plenum chamber and spray booths whose walls, ceilings, and floors are covered with a tacky, non-drying material designed to catch any remaining particles. As an added precaution, the air is finally passed through a series of 4-in.-thick filters, which absolutely eliminate any dust trace.

The air then enters the enclosed paint department, which is slightly pressurized to keep air flowing outward. Unfiltered air never enters the paint department.

Nineteen paint operations go into the making of an Imperial. Four gallons of primer, sealer, and finish paint are applied to each car.

**Insurance against air conditioner and body leaks . . .** Automatic leak detector—the "Sniffer" (left) finds refrigerant leakage in air conditioner lines. Any escaping refrigerant passes over a sensitive electronic element in the sniffer housing as the unit probes the lines. Element actuates an electrical alarm buzzer, which is broadcast over a miniature loudspeaker, indicating to the checker where leakage must be repaired. Leakproof cars are insured by a 100% test (right). Water test on the final assembly line is handled by special booths that deluge each vehicle with a volume of water equal to that of 8 in. of rain during test period



**1 . . Tests compare operating costs** of acetylene equipment and natural-gas equipment for cutting steel plates

**In a search for cost reductions, Pioneer Engineering has run a series of tests comparing acetylene and natural gas as fuels for the oxygen cutting of steel. Test results point to . . .**

# Natural gas for cheaper cutting

WILLIAM J SEMPLE, manager, Production Methods Dept, PIONEER ENGINEERING DIV OF POOR & COMPANY, INC, MINNEAPOLIS, MINN

Natural gas is cheap and widely available. But in spite of the savings that could be made by substituting it for acetylene, natural gas has not received the attention it deserves as a fuel for oxygen cutting.

Pioneer Engineering has a direct interest in this type of saving because of the large volume of plate and structural steel that are cut to size and shape for the company's products: equipment for mines and cement plants, aggregates-processing machinery for the gravel and rock industries, and asphalt mixing and paving machines.

However, we were not able to find comprehensive published information on the comparative cost of these two fuels for cutting, so we decided to run our own series of tests. The purpose of the tests was to ascertain which type and make of equipment, operating on either natural gas* or acetylene, would give the lowest total cost for oxygen cutting while maintaining satisfactory quality.

A cut of acceptable quality was defined as one which would require a minimum of slag removal, would have good fit-up as a welded edge, and would present a good appearance when a free edge. Cuts were made on four thicknesses of plates, covering the range most often used at Pioneer: ½, ¾, 1, and 1½ in.

Each piece of equipment tested was supplied by its manufacturer. This insured that all equipment would be in top condition. The object of the tests was explained to the manufacturers, and a representative of each one was present at all tests of his equipment to instruct in its proper use.

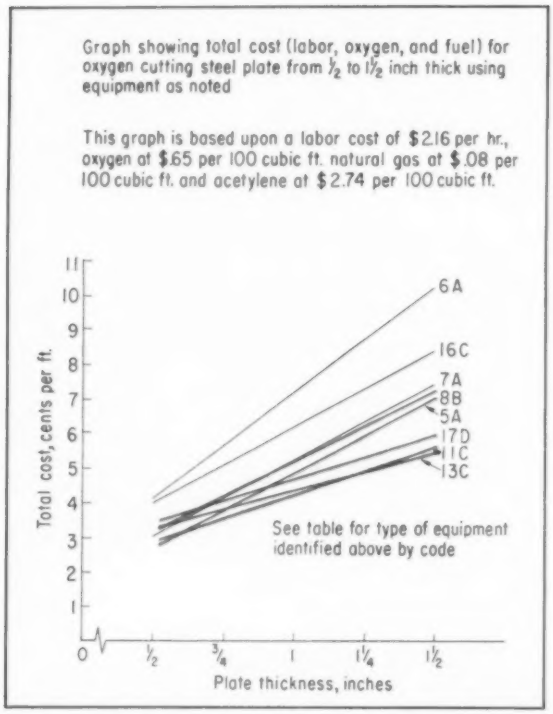
* The natural gas supplied to the Pioneer plant is 0.15% oxygen, 0.15% carbon dioxide, 73.47% methane, 13.50% ethane, and 12.73% nitrogen.

### Test setup and procedure

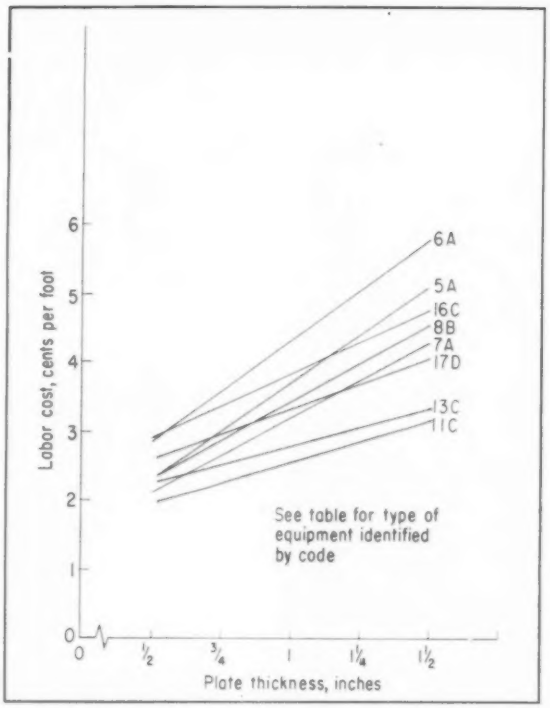
A special test area was set up in a little-used corner of one building. A supply of natural gas at 14 psig was available. Oxygen and acetylene were provided in cylinders. A variable-speed carriage with a blowpipe holder supported and moved the blowpipe during the tests. Three Fischer flow meters measured the gas flow. A pair of horses, pressure gages, a stop watch, and a supply of mild steel plate in the thicknesses to be tested completed the material required.

All tests were conducted under the supervision of a member of the Production Methods Dept who also recorded all data. A burner from

## Natural gas for cheaper cutting . . .


Graph showing total cost (labor, oxygen, and fuel) for oxygen cutting steel plate from ½ to 1½ inch thick using equipment as noted
This graph is based upon a labor cost of $2.16 per hr., oxygen at $.65 per 100 cubic ft. natural gas at $.08 per 100 cubic ft. and acetylene at $2.74 per 100 cubic ft.
Total cost, cents per ft.
Plate thickness, inches
6A
16C
7A
8B
5A
17D
11C
13C
See table for type of equipment identified above by code

**3 . . Total cutting cost** based on labor @ $2.16 per hr, oxygen @ 65¢ per 100 cu ft, natural gas @ 8¢ per 100 cu ft, and acetylene @ $2.74 cu ft




**4 . . Labor cost** based on labor @ $2.16 per hr, Overhead is not included, because comparison would not change

**2 . . Cuts meet high standards** to qualify in comparison tests, must have good appearance and fit-up and require minimum slag removal

the shop operated all burning equipment.

As the first step, a piece of plate of the correct thickness, free from appreciable rust or scale and at room temperature, was selected and placed across the horses. After a few trial cuts, two lines were chalked across the plate perpendicular to the travel of the carriage. These marked a 12-in. course for the cut. Then the speed desired by the representative of the equipment manufacturer was set approximately on the carriage control.

The time for the 12-in. cut was recorded from stop-watch readings and the actual speed computed. During the cutting, the flow meter and pressure-gage readings were recorded. The time and data for calculating gas consumption during preheats and pierces were also recorded for each thickness.

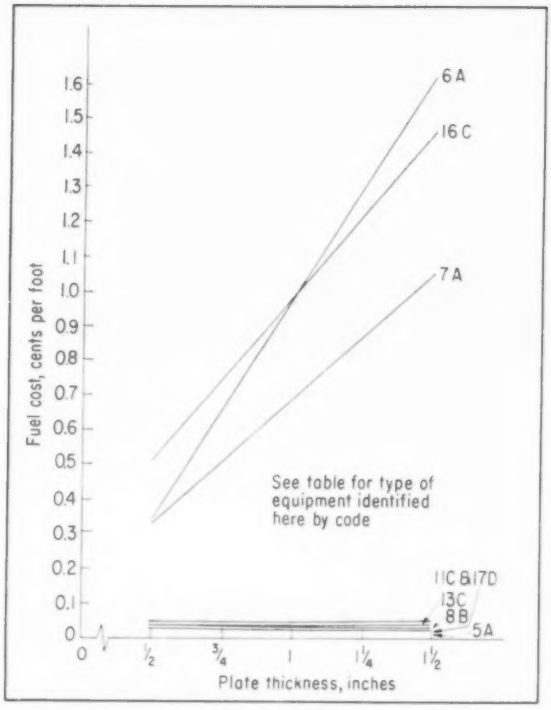
It should be realized that during actual production operations optimum operating conditions will seldom be achieved. This makes it necessary to asume that each piece of equipment would run at the same percent of optimum during production, if the test results are to be considered valid for production.

### Results

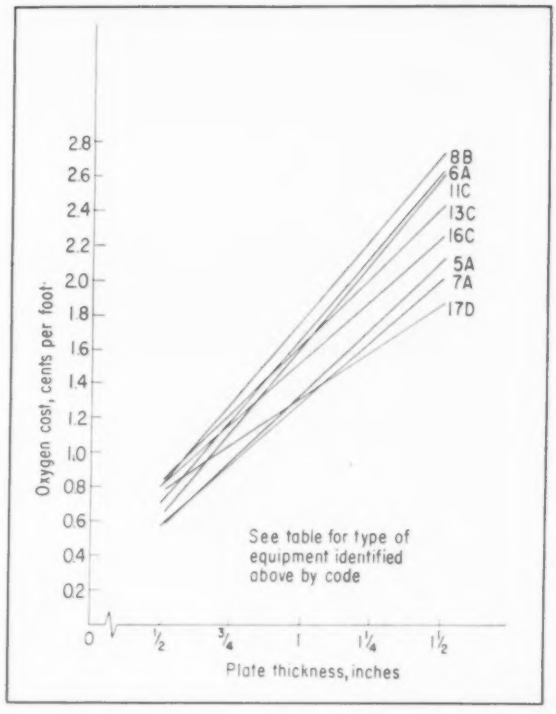
The equipment tested was supplied by four manufacturers and included 2-hose and 3-hose, natural gas and acetylene, low pressure and medium pressure. Some had preheat regulators, and others did not.

In all, 18 different pieces of equipment were tested. The table lists the characteristics of the eight that gave the best results, and Figures 3 through 6 show graphically the test data produced by the same eight.

Fig. 3 compares the total cost of cutting 12 in. of mild steel plate with labor at $2.16 per hr, oxygen at $0.65 per 100 cu ft, natural gas at $0.08 per 100 cu ft, and acetylene at $2.74 per 100 cu ft. The costs for material handling, setup, and layout have not been included, because the same amount would




**5 . . Oxygen cost at 65¢ per 100 cu ft**




**6 . . Fuel cost** based on acetylene @ $2.74 per 100 cu ft and natural gas @ 8¢ per 100 cu ft

have been added to each test and would not have changed the comparative results.

Based on the above costs, the curves show in general that natural-gas equipment has the advantage over acetylene equipment for the entire thickness range covered. The only acetylene equipment that challenges natural gas is 7A, which manages to tie for second place on the thinnest plate cut.

The curves in Fig. 4 which compare labor costs show that 11C and 13C are the low-cost equipment. Their advantage becomes more pronounced as the plate thickness increases, and at 1½ in. the cost for 11C is 2.5 cents per ft less than the cost for 6A.

The oxygen cost per ft of cut is plotted in Fig. 5. Neither the natural gas nor the acetylene equipment showed a definite advantage here. The maximum difference occurred at 1½ in. between 8B and 17D, both of them using natural gas, and amounted to less than 0.9¢ per ft. The other equipment, some natural gas and some acetylene, was scattered between.

The cost of fuel gas as shown in Fig. 6 is much lower for natural gas equipment. The advantage varied from 0.3 to 1.6¢ per ft for plate thicknesses from ½ to 1½ in.

Therefore, the conclusion based upon these tests is that over the range of plate thicknesses cut during testing, natural gas has a definite cost advantage over acetylene as the fuel in oxygen cutting.

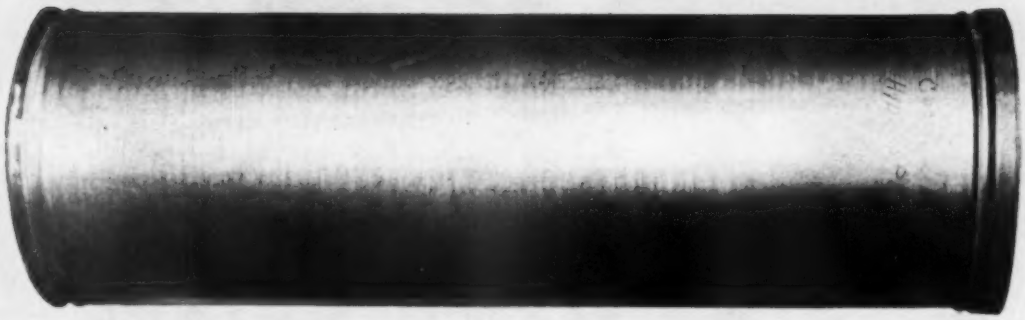
For manual cutting we decided on equipment 11C because of its low cost, and because the two-hose torch without preheat regulator is easy to handle. For machine cutting we selected 13C, a bulkier piece of equipment with three hoses and preheat regulator. The deciding factor for 13C was that, in addition to having a low cutting cost, it also had the lowest cost for preheating and piercing.

Both of these pieces of natural gas equipment have been installed at Pioneer and are doing an excellent job.

**Table of cutting equipment tested**

| Equipment | Cutting Fuel | | No. of Hoses | | Cutting Gas Press. | | | Preheat Regulators | |
|---|---|---|---|---|---|---|---|---|---|
| Test No.* | Natural | Acet. | 2 | 3 | Low | Medium | None | Oxy. Only | Both |
| 5A | X | | | X | X | | | | X |
| 6A | | X | X | | | X | X | | |
| 7A | | X | | X | | X | X | | |
| 8B | X | | | X | | X | | | X |
| 11C | X | | X | | X | | X | | |
| 13C | X | | | X | X | | | X | |
| 16C | | X | X | | | X | X | | |
| 17D | X | | | X | X | | | X | |

* Letter part of test number indicates manufacturer of equipment.



**Workability . . .**
of new low-alloy ultra-high-strength steel is shown by roll flowing (Hydrospin) 0.080-in.-thick-wall cylinder (above) from 0.250-in.-thick-wall cylinder (right). Latter was rolled from plate and welded with inert-gas-shielded arc. After roll flowing, cylinder was air quenched and tempered to maximum tensile strength. There was no cracking

# Found...a low-alloy steel for

**Airsteel X-200, now available from US Steel Corp, was developed to solve missile manufacturing problems. It is as workable as AISI 4340 and air hardenable to 280,000 psi tensile strength. Simplification of production problems lowers ultimate missile cost**

WILLIAM M STOCKER, JR, associate editor

**Until now, West Coast missile makers have had problems manufacturing skins and structures from the high-alloy steels necessary for high strength. For one thing, welding has been complicated. Even more important, high-alloy steels generally require oil or salt quenching. Most of the quenching facilities for large structures are in the East or the Midwest.**

As a result of these problems, steel companies were asked to provide a workable, air-hardenable steel having the lowest carbon content consistent with good weldability, plus strength and heat resistance suitable for missiles.

To meet this need, development and production of a new ultra-high-strength low-alloy sheet steel is announced by US Steel Corp. Under the laboratory designation Airsteel X-200, the new steel evolved after more than two years of research, development and evaluation at US Steel's Research Center in Monroeville, Pa. Commercial heats have been produced or processed at several of the company's mills across the nation.

Produced in the annealed or "soft" condition for comparatively easy forming or cutting (equivalent to 4340), this material, when cooled in air and tempered, develops tensile-strength levels in the 280,000 psi range. Flat-rolled sheet provides a minimum of 5% elongation, transverse and longitudinal, in the full-hard condition. In general, the new steel attains this high strength level as a result of carefully balancing the alloying elements silicon, chromium, molybdenum, and vanadium. It contains the minimum composition, including the lowest carbon content for good weldability, with no undissolved carbides. Notch sensitivity is extremely low.

For oil or salt quenching the high-alloy steels, huge quenching tanks must be built to accomodate large missile parts or these parts must be shipped to suitable heat-treating facilities. Inadequate capacity can cause variations in the strength levels in a part as well as distortion from uneven stresses caused by uneven quenching action. Elaborate methods are needed to straighten distorted parts. Air hardenability minimizes these problems.

Missile materials are commonly thought to be useful at temperatures up to within 100 F of the temperature at which they are tempered. Normally, Airsteel is tempered at 700 F; provides 210,000 psi yield and 280,000 psi tensile strength at temperatures up to 550 to 600 F.

US Steel's Consolidated Western Steel Div has conducted exhaustive fabricability tests on the new steel at a headquarters plant in Los Angeles. Studies include forming, fitting-up for welding, welding, heat treating and roll flowing. Various missile cases, with and without longitudinal welds, were made.

Weldability studies show that the welded joint is equal to the strength level of the parent Airsteel. Welding was by inert-gas-shielded fusion method, using both a non-consumable tungsten electrode with a separate filler wire and a consumable electrode. Both techniques appeared equally satisfactory.

Typical missile components, after forming and welding in the annealed condition, were heated to an established temperature, allowed to air cool to room temperature, tempered at 700 F, and again cooled to room temperature. This procedure gave the parts the desired strength, ductility and toughness. The metal was not brittle.

Airsteel X-200 was developed specifically to solve missile-production problems. While it competes with high-alloy tool steels for missile skins and structures, it is not ex-

**Welding . . .**
tests on Airsteel X-200 show welds made by conventional methods are as strong as parent metal

# missiles

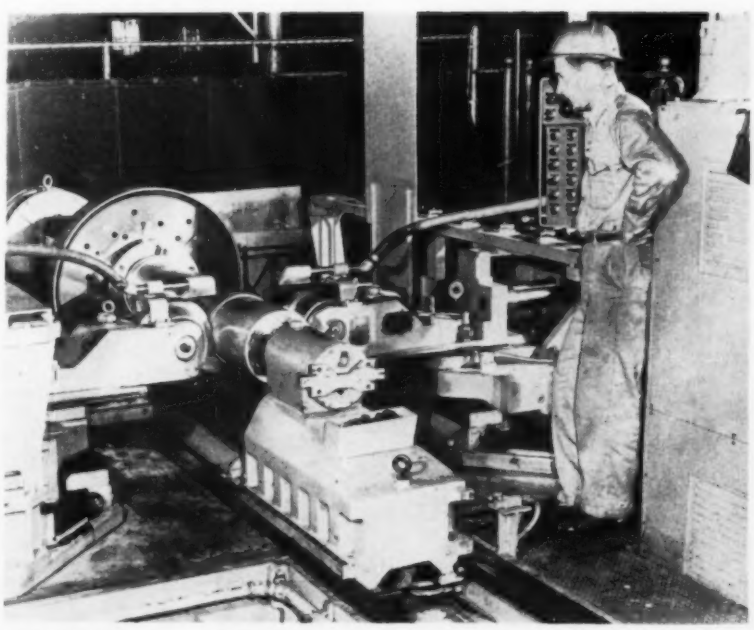
pected to compete with them as a tool material.

Properties of this alloy are suited to structural applications rather than tooling. Marketers at US Steel anticipate use in internal strength members, structural components, web panels, etc for aircraft, as well as some special non-aircraft applications. This alloy steel is available in billets, blooms, bars, plates and sheets, along with US Steel's various stainless and high-strength, low-alloy steels.

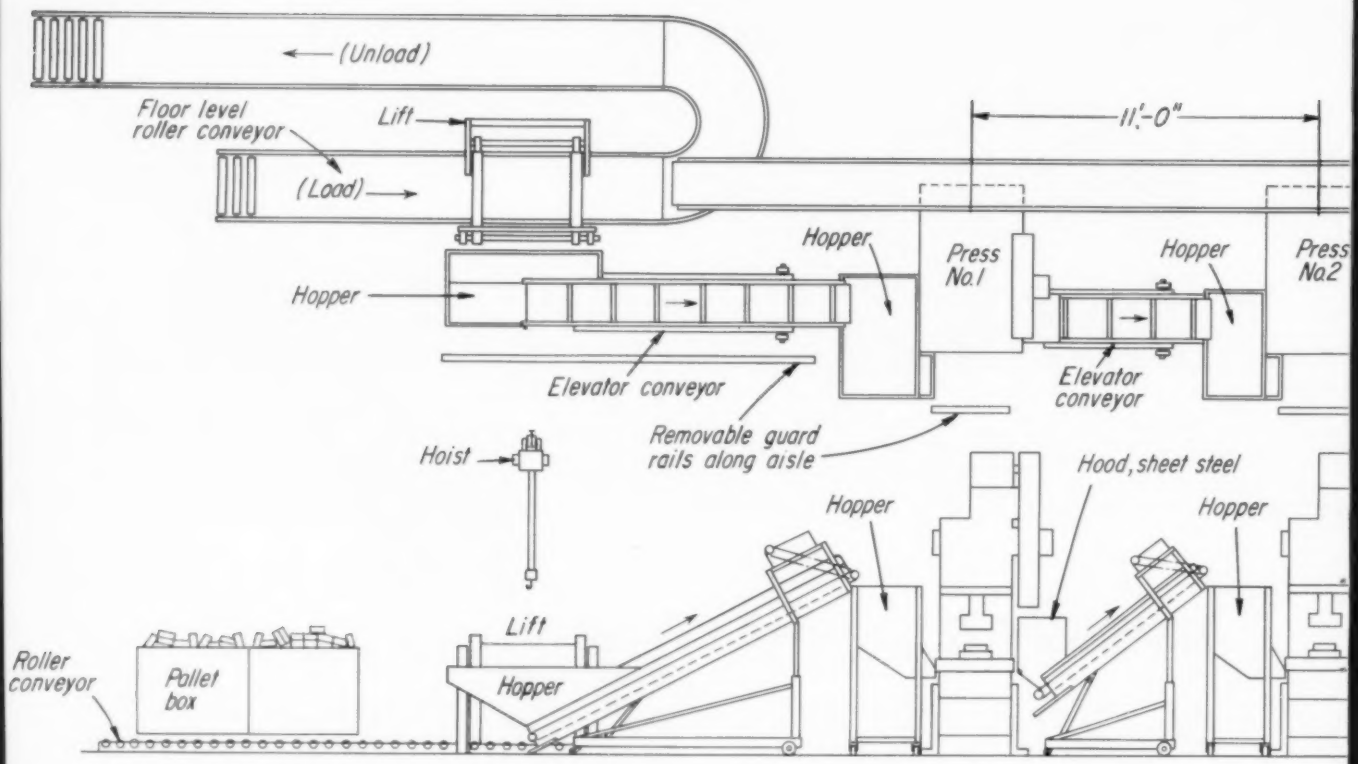
Providing 80,000 psi yield and 110,000 psi tensile strength in the annealed condition, for working, the new steel parallels 4340 in workability at various hardnesses. In fact, the AMS specifications for 4340 served as a guide to developing its properties. Nevertheless, 4340 does not approach the strength range of Airsteel.

Cost of the missile alloy is slightly higher, as a raw material, than that of the high-alloy steels. However, the actual cost of components using Airsteel is expected to be at least 2 to 4% cheaper than when high-alloy is used, as a result of the higher strength inherent in the new alloy.

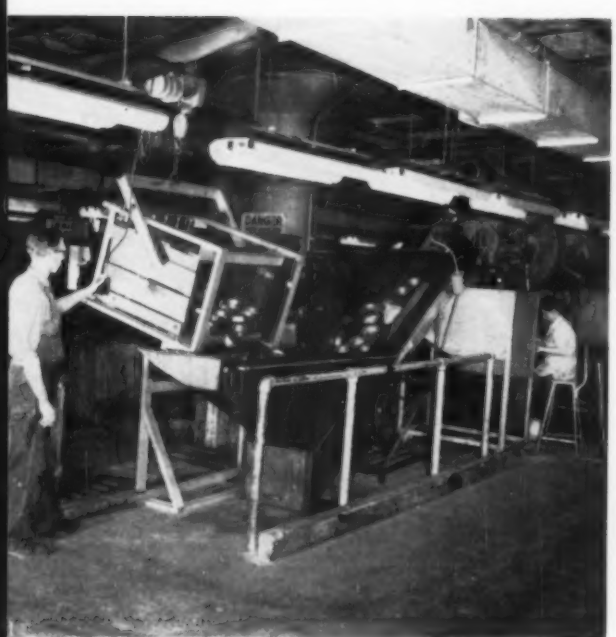
When developed to its ultimate properties, Airsteel has a superior strength-weight ratio hence less material is needed for equivalent properties. Also, simplification of fabrication and heat-treatment requirements offers a sizable reduction in manufacturing cost.



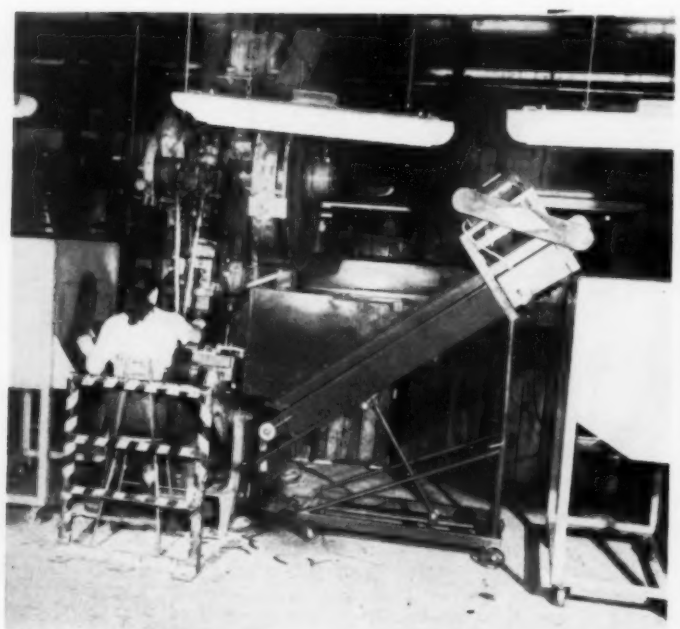
**Roll flowing . . .**
and extensive other manufacturing tests were done at US Steel Corp's Consolidated Western Steel Div near Los Angeles. Developed to meet the special problems of West Coast missile firms, this alloy is finding considerable interest from missile industry across the country



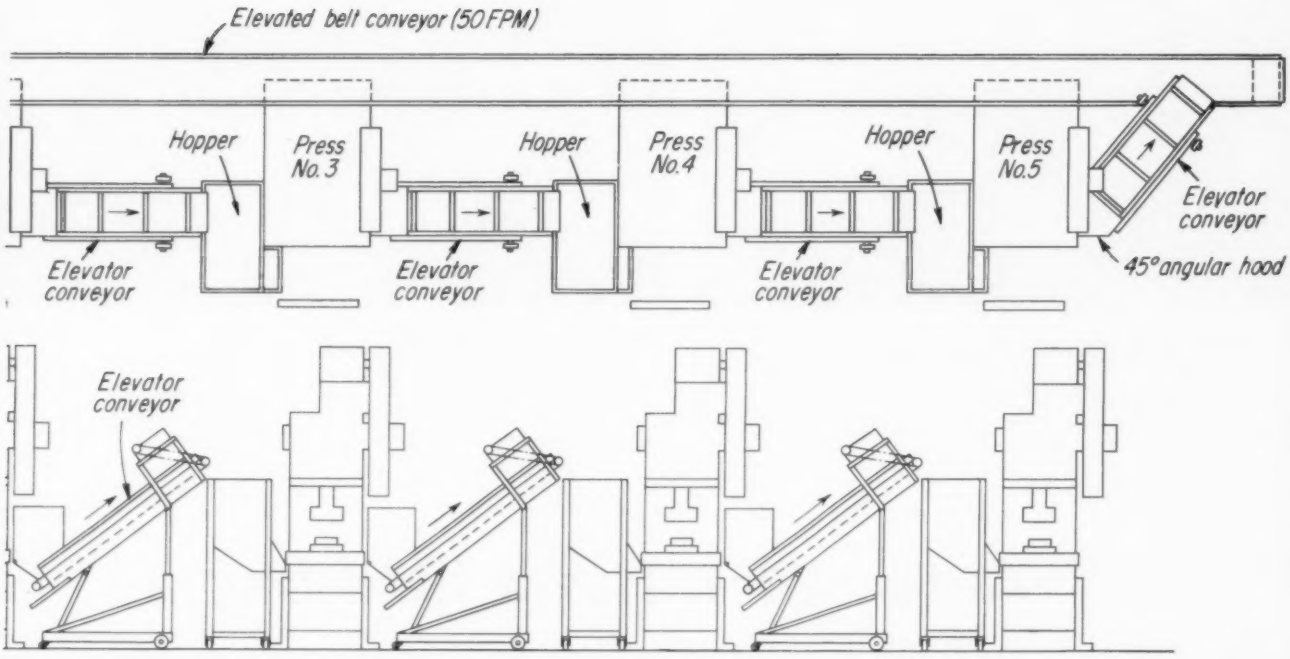

# Conveyorized Press Line



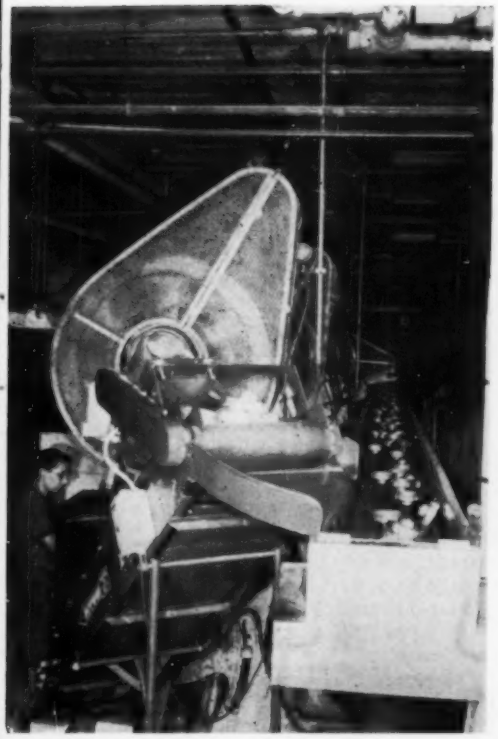
**Materials handler . . .**
hoists pallet box of workpieces to first hopper on press line. He does not touch work again until boxes are reloaded by return conveyor



**Mechanical workhandling . . .**
equipment at each press includes a chute-bottom hopper at left and an Arrow portable elevator-conveyor at right to deliver parts to the next hopper in line




# Increases Productivity by 17%



LEO J KEVITT, manager of manufacturing, and ANTHONY WEIGL, plant layout engineer, Alemite & Instrument Div, STEWART-WARNER CORP, CHICAGO

Secondary press operations too often require much manual handling. Job lots may be frequent, and some of the presses will be needed on one job, the others on another part. "Automation" normally seems out of the question.

We overcame these problems in our main plant by equipping a line of five Bliss No. 21-B OBI presses with chute-bottom hoppers and elevator conveyors. Now the presses can be used individually, as a line, or a line split into two sections. All of the mechanical handling equipment is on casters.

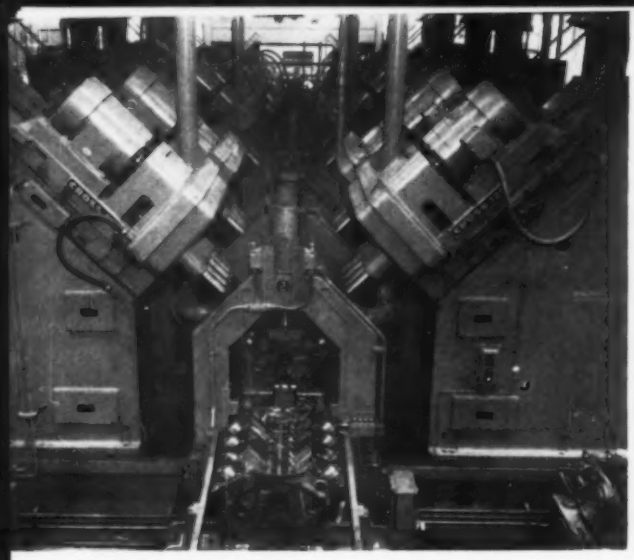
Manual handling is now restricted to reaching into the chute of the hopper at left of the operator and placing the piece in the dies. After the operation is performed, the part is blown into the elevator conveyor. Press cycles are not delayed for press unloading.

Our productivity increase by conveyorizing the press line amounts to 17%. Additional benefits are reduced operator fatigue and improved safety. We now have maximum flexibility to cope with frequent changes in production schedules.

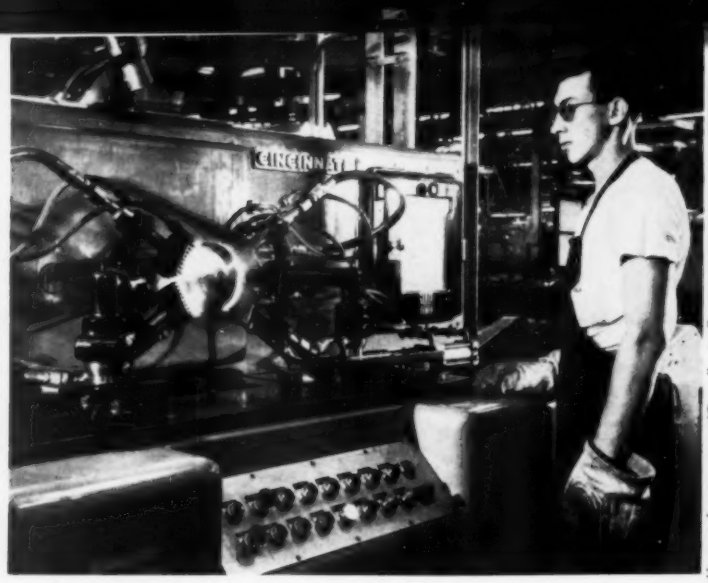
Instead of serving all presses in the line, lift trucks now are needed only to bring pallet loads to the loading end of a floor-level, U-shaped roller conveyor, and to take reloaded pallet boxes from the unload end. In coming pallet boxes are dumped into a large hopper with aid of a ½-ton Yale & Towne hoist.

Four of the Arrow portable elevator-conveyors have in-line loading hoods and discharge chutes. The fifth elevator-conveyor, at the end of the press line, has a 45° loading and a 45° discharge chute for delivering parts onto the return belt conveyor at the rear of the line.

**At last press . . .**
the elevator conveyor has its loading hood and discharge chute at 45° to drop work onto return belt conveyor behind the press line



**Batteries of drills . . .**
. . . automatically drill and ream valve guide holes in engine blocks at Ford's new Lima Engine Plant, Lima, Ohio. Blocks pass through 16 different operations as they move down this 50-ft-long Cross machine. Dust-extracting tubes in the center remove all cast iron dust from area



**Flame-throwing principle . . .**
. . . has been adapted to metal-hardening at Lima. This Cincinnati Flamomatic hardens the gear on an engine camshaft sprocket. As gear is revolved, machine hardens the teeth to a very close tolerance. Then part is automatically ejected into an oil bath, is quickly quenched.

# Automation has a field day as

**Automation is the keynote at Ford Motor Co's fabulous new Lima Engine Plant, opened to the press for the first time on August 13. Some examples: the auto industry's most completely automatic crankshaft machining lines, and in-process quality control gages, inline machines and gun-drilling operations everywhere in the huge, 1-million-sq-ft plant, which can turn out something like 4000 Mercury, Edsel, Lincoln and Continental engines a day if demand warrants.**

But automation at Lima is not indiscriminate, it has been carefully thought out, subjected to thorough analysis: Can it increase quality, improve efficiency and working conditions, achieve greater safety?

### Outstanding Crankshaft Line

Take for instance, Lima's automated crankshaft area, most outstanding feature of the plant. There, 80-lb shell-molded crankshafts automatically move through the series of machine tools that make up a 588-ft-long machining line.

Each line starts with milling ends of crankshafts, then center drilling them in Sundstrand rise-and-fall transfer milling machines. Main bearings, post end and seal diameters are rough and finish machined in LeBlond lathes. Roughing and finishing of pin bearings is also done in LeBlond lathes. Kreuger-Barnes 36-station inline transfer machines drill all oil and lightening holes, after which Snyder 14-station double-end transfer machines drill, counterbore, re-center, tap, and spotface the shafts.

Finish grinding of the main bearings and pin bearings is done in Landis equipment before the parts are washed. Among final operations are finish turning the No. 3 main bearing thrust wall and finish facing the hub dia, as well as finish turning the port dia and gear face in Sundstrand automatic machines. Keyways are produced in Sundstrand milling machines and the bearings are polished in Impco 4-station microfinishers.

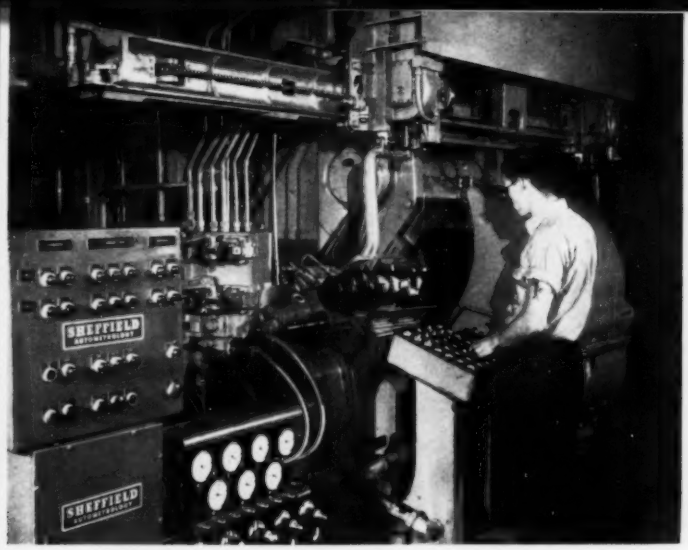
Three identical crankshaft lines (with automation installed between operations) drastically reduce manufacturing costs, compared with previous setups. Crankshafts are automatically loaded and unloaded at various stations: are lifted, revolved and positioned with pin-point precision. Multiple-station quality control gages are built into many of the machines and the part is thoroughly inspected before it passes to the following operation.

If the crankshaft does not meet specifications, the gage automatically rejects it and production halts. The trouble area is indicated on the control console and tooling corrections must be made before machining operations can be resumed. The crankshafts are also electronically balanced by machines which test their own work and, if not satisfactory, automatically repeat the operation. An out-of-balance crankshaft cannot escape the electronic unit.

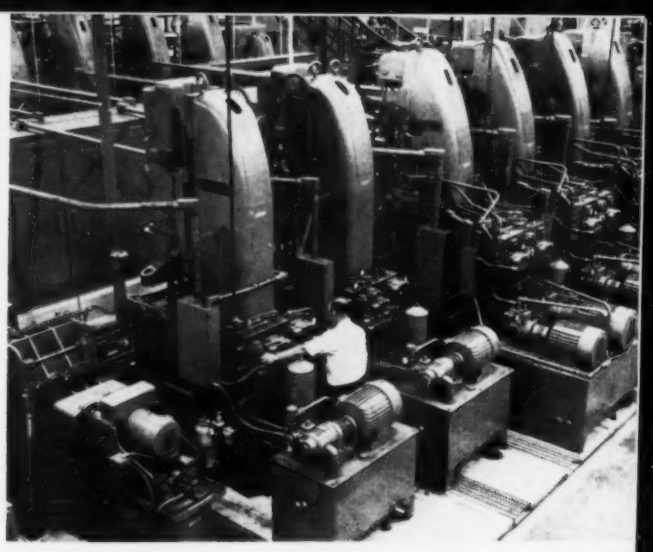
### Inline Machining

Inline machining operations along the cylinder block line are performed on simple, compact new equipment to allow more production in the same area and reduce handling and floor space requirements. This equipment includes Cincinnati milling and broaching machines, Sundstrand transfer machines for rough boring cylinder bores, Cross machines for drilling blocks, Ingersoll transfers for rough boring cam and crank bores, and Ex-Cell-O machines for semi-finishing cylinder bores. New Micromatic Hones with automatic size control finish cylinder bore diameters within 0.0003-in. tolerances, instead of the 0.0005-in. previously held. Fast automatic electric and air-operated Sheffield gages provide a more efficient means of checking bore sizes.

The new inline machines also add to the quality of the part because a greater number of tools can be con-




**Quality control gages . . .**
. . . keep close check on crankshafts during machining. This completely automatic LeBlond lathe machines and rough turns pin bearings on the crankshaft, is controlled by a Sheffield gage that records any variance in the operation. Tooling corrections are then made



**Gun drilling . . .**
. . . is done on the cylinder head line at Ford's Lima Engine Plant by this upright Foote-Burt machine, which also reams. Equipment, adapted from principles used in drilling gun barrels, is highly accurate, operates approximately three times as fast as conventional machining

# Ford unveils its Lima Engine Plant

centrated in each machine, thus insuring an exact cut by all tools. Chip disposal is provided for by drags under the lines and a central system to which chips are carried.

On the cylinder line, highly accurate Foote-Burt gun-drilling machines are approximately three times as fast as conventional drilling equipment, so that one gun drill can do the job of three conventional machines.

A W. F. & John Barnes in-line setup on the connecting rod line completely machines four rods at a time. Previously, the rods were individually transferred through separate machines. Now they never leave the Barnes setup. As a result, locating and positioning problems are reduced and greater accuracy is achieved in machining.

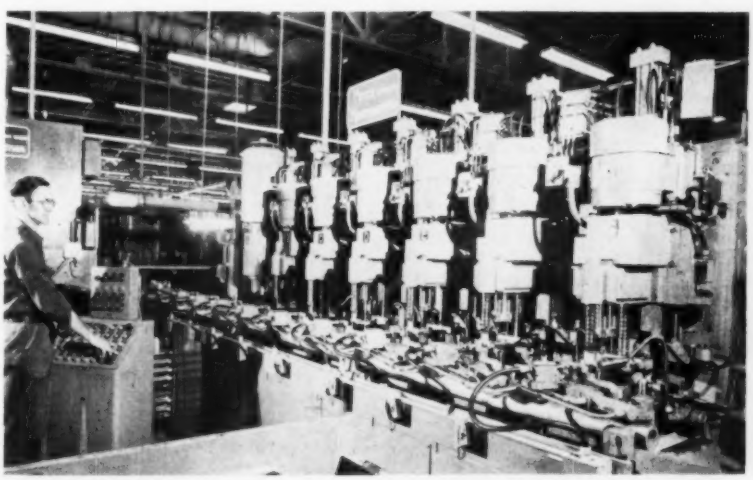
Similarly, Motch & Merryweather equipment for machining pistons provides multiple, automatic, in-line operations to replace separate setups previously used. A line of Ex-Cell-O boring machines follows these machines.

### Machining Castings

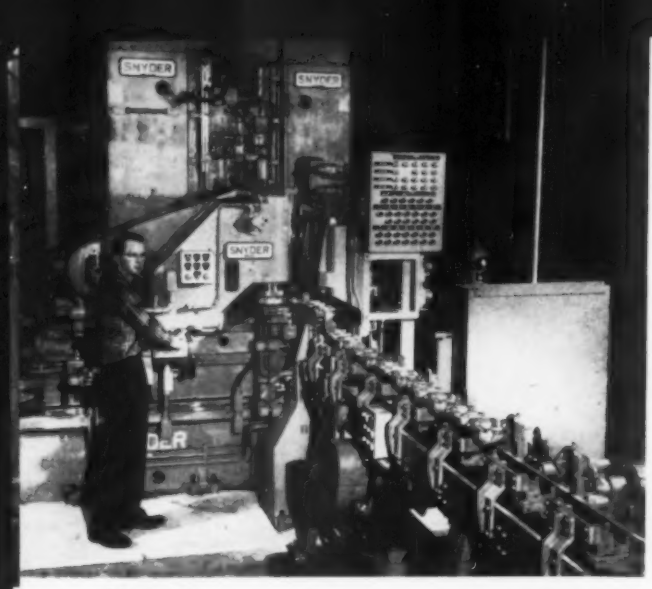
Of particular interest are Natco machines that machine two different aluminum castings—each of which is made of a different aluminum alloy and differs in shape and geometry. One casting is a front cover for a power steering unit and the other is for a conventional steering unit. These machines not only permit scattered, or interchangeable, loading of the two different parts, but handle the different materials without changing tools, spindle speeds, or feed rates.

Ford engineers developed optimum cutting tool angles to suit both materials. Normal spindle speeds are reduced and conventional feed rates are increased to maintain capacities while machining the different alloys.

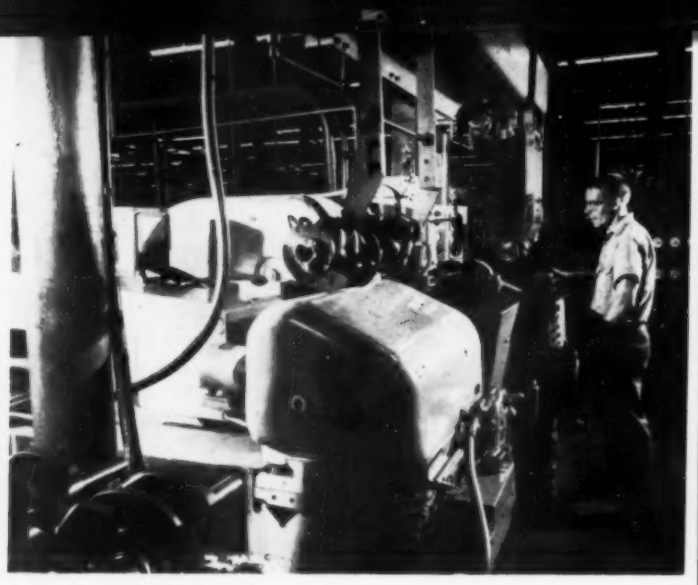
A cold extrusion production method, used for the first time in the automotive industry at Ford's Cleveland Engine Plant No. 2, has been further perfected at the Lima plant, resulting in considerable material saving. In this process, small steel slugs, cut to 2⅜ in. lengths on 4-spindle Conomatics, are coated with phosphate and liquid soap lubricant



**Seven different operations . . .**
. . . (drilling, milling and reaming) are performed at Lima on engine pistons as they pass through this completely automatic Motch & Merryweather machine, which can machine as many as 600 pistons an hour




**28 stations . . .**
. . . of this automated machining line drill, mill and tap an exhaust manifold at the Lima Engine plant, pointing up the plant's accent on automation



**Grinding main bearings . . .**
. . . of a crankshaft at Ford Lima is done on this Landis multiple-wheel grinder, marking one of the auto industry's first attempts to grind crankshafts automatically

and automatically positioned in a Danly H2-100 dual-slide press.

Carbide punches, mounted on two opposing rams, strike the ends of the slub with 100 tons pressure to extrude the cold metal into the die, thus forming the piston pin. Another strike is then made, this time by flat punches to square the ends, after which the pins are automatically ejected from the press. The entire operation is accomplished at a rate of over 1,900 piston pins an hour. When extruded, pin length is increased to 3½ in.

Prior to development of the new press, it was necessary to begin with a steel slug this size and drill the interior to form the piston pin—a wasteful, time-consuming method. Only drilling operation necessary now on an extruded piston pin is to bring the pin within weight tolerances. The pins also pass through heat-treat furnaces and automatic grinders, which finish the outside diameter.

An electronic machine in a temperature controlled room precision inspects all pins before they are sent to assembly areas. The pins are fed into the machine in rapid-fire order and are sorted into three different classifications, according to minute differences in size and weight. Piston pins that fail to meet rigid engineering specifications are automatically ejected by the machine.

In-process quality control has been developed to the highest degree at Lima. Automatic multiple-station checking gages have been integrated into production lines, where they keep a constant check on all engine parts during machining processes.

In addition to inline inspection mechanisms, approximately 1700 different gaging applications are in use at Lima. Many are duplicated along identical machining lines, creating several thousand separate gaging operations. Care and maintenance of the gaging equipment is handled completely by quality control personnel.

Among other features of the assembly and testing areas of the Lima plant is a TelAutograph communication system that insures precise and rapid fitting of parts.

As a cylinder block reaches the beginning of the assembly line, its dimensions are checked and transmitted via TelAutograph to various locations in the plant where engine components are selected to match the cylinder block dimensions. The components are placed on conveyors for delivery to engine assemblers and reach the asssembly area shortly before the matching engine block.

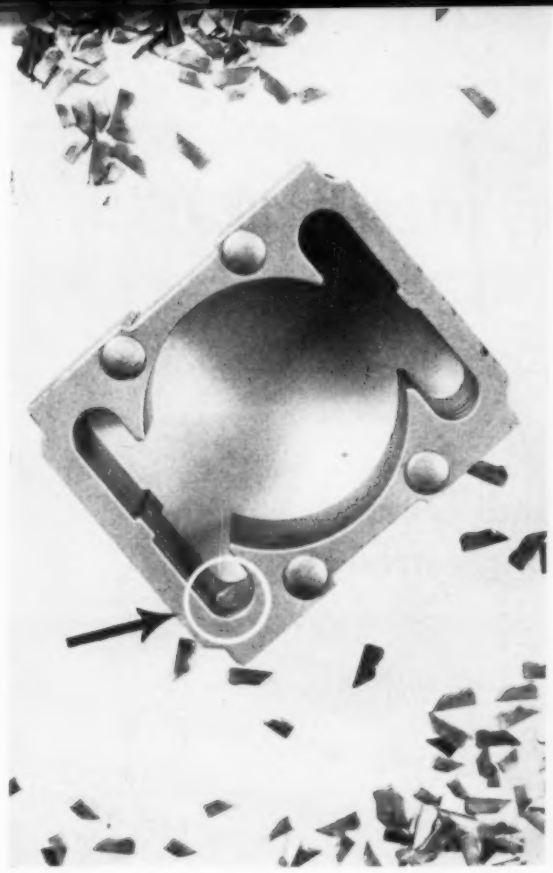
The assembly area has two lines, each composed of 31 independent power and free conveyor units tied together like links in a chain. This system makes it possible to continue production along the line even though one segment of the line may be down for repairs. Engine blocks are suspended from the overhead monorail tracks on special steel-arm carriers.

**Telephone system . . .**
. . . is an important maintenance tool at Lima. Phone equipment is installed along the 70-ft cylinder block front cover line to enable maintenance personnel to establish contact with operator and control console while making repairs along the line. This cuts maintenance time to a minimum

### Telephone Maintenance Setup

To simplify maintenance problems, telephone equipment has been installed on the cylinder block front cover line, which is approximately 70 ft long and has 26 different stations for machining the aluminum die cast part. A telephone set was installed at the start of the line where the operator and control panel are located and telephone inlets were spotted on all stations along the line.

When a breakdown occurs, the operator directs the maintenance man to the trouble area, where he plugs in his earphones and remains in constant touch with the operator—and the control console—while making necessary adjustments.

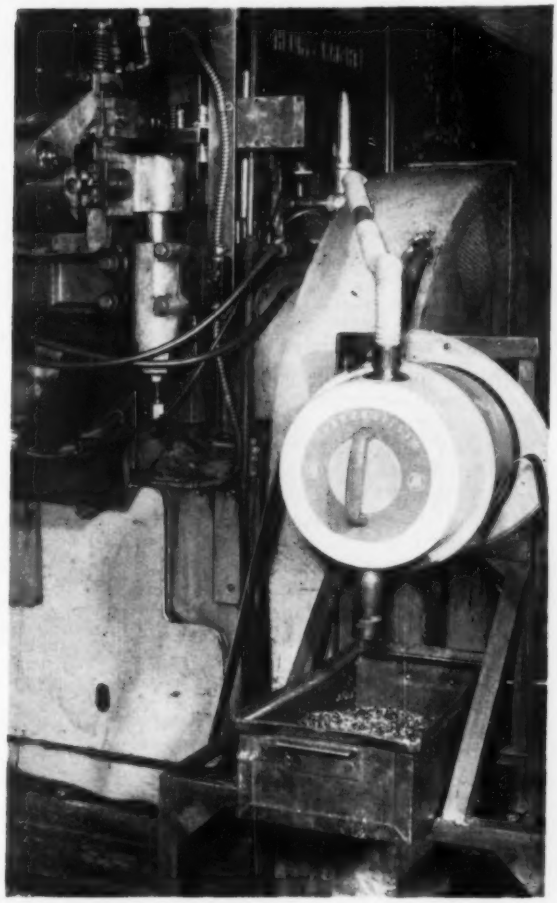


**Slug trapped in laminations** of a motor core will short circuit the core if not detected and removed before field coils are installed. Four slugs are trimmed from the corners of each lamination. This adds up to a considerable number of slugs per inch of core stack, any of which could be trapped in the core

# Vacuum cleaner removes slugs . . .

**. . . before stacking of motor-core laminations. Trimmings from corners of rectangular stampings tend to cling to the stock and travel through the die into subsequent stations. Here's a quick and inexpensive method of insuring positive slug removal**

MYRON HOWE, foreman
L F DUNPHY, quality control supervisor,
Electric Appliance Division,
WESTINGHOUSE ELECTRIC CORP, EAST SPRINGFIELD WORKS, MASS



**Positive slug removal** is achieved with a canister vacuum cleaner attached to the press. A hose connection between a funnel under the die and the cleaner provides continuous suction to draw slugs out of the die. Because of the cleaner's vertical position, the slugs drop by gravity from an inner screen

A canister vacuum cleaner has been modified to remove small slugs from motor-laminate stampings. The results—increased die life, no rework costs, and improved core quality.

Such are the findings at the Westinghouse East Springfield plant where motor cores for portable-food mixers are made. The slugs are produced at the trimming station in a progressive die. Provisions for slugs to fall through a clearance hole in the die had previously been made, but some would scatter in other directions and get caught between the stock and the die.

Air blasts, through lines connected to the die failed to remove all slugs thus caught because stock-lubricating oil made them cling to the stock. This method also created an eye-injury hazard to employees working in the area. Shear grinding, notching the punches, and other die-design modifications were tried with equal dissatisfaction.

In addition to disfiguring the stamped laminations, trapped slugs presented double thickness of stock at the final cut-off station, damaging the tools. Even more serious were the undetected slugs that lodged between laminations in the pack chute, producing defective cores and making frequent expensive reworking costs unavoidable.

Connection between the die and vacuum cleaner is made with a funnel fitted to a standard cleaner hose. The funnel is attached to the die shoe under the milled slots at the rear of the die where the four corners of the laminations are trimmed.

The slugs are collected in a capped-tube extension which is added to the vacuum cleaner in place of the "toss-away" bag. When the operator installs a new coil of stock, he also unscrews the cap of the tube and empties the slugs into a tote pan under the cleaner.

# Sees widespread use of numerical control by 1963

**Five years from now, all industries will be using numerical control to a greater or lesser extent, it was predicted by Myron S. Curtis, vice president engineering Warner & Swasey Co., Cleveland, speaking recently at Purdue University.**

The extent to which a company employs numerical control will depend upon the size and complexity of its product and the cost of numerical controls themselves.

### Milling Machines' High Potential

"At the top of the list of machines that have the greatest potential for numerical control," Mr. Curtis said, "I would put milling machines—particularly the larger types such as skin mills and milling machines for various types of contour milling on large and complex shapes."

This, he said, is because operations on such machines are usually pretty complex, parts are put through it in comparatively small quantities, and the cost of the machine itself is large enough so that the extra cost for numerical control can easily be absorbed.

At the other extreme, Mr. Curtis said, is use of numerical controls on machine tools for positioning only. This, he added, would include boring mills, jig borers, drillpresses and the like.

### Positioning Applications

Reason behind this thinking, according to Mr. Curtis, is that numerical control for positioning is comparatively simple and inexpensive. And, in this field, under certain conditions there may be applications for numerical control in high production, he said.

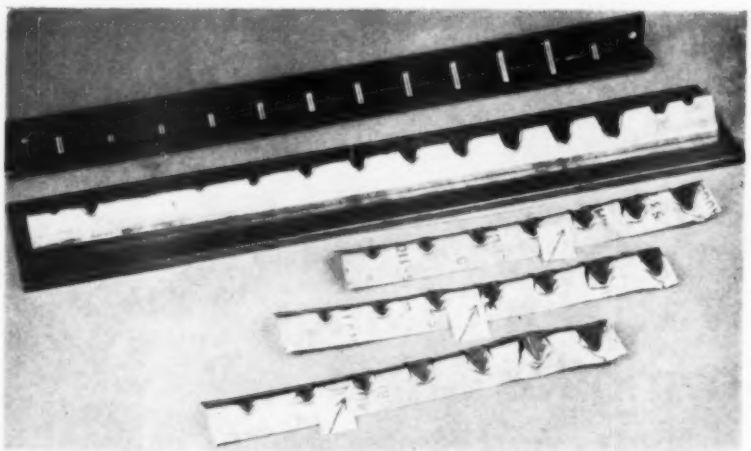
Another group of machine tools to which numerical control may be applied more and more as time goes on includes knee-type milling machines, lathes of various types, and several different kinds of pantograph machines.

### Control of Transfer Machines

"I have not mentioned the controlling of transfer machines by tape control," Mr. Curtis told his audience. "There has been some of this done, and there will be a lot more of it. But there is a question in my mind as to whether or not it can be called 'numerical control' as we are talking about it here. I believe, of course, that all machine tools will use numerical control to some extent, but these types, in my mind, offer the greatest potential.

"Numerical control is with us to stay," Mr. Curtis concluded, "and while it is now in its infancy, it will grow to a lusty manhood. No machine tool builder, no machine tool user can afford to be ignorant of this development . . . If it pays to use numerical control, use it; if it doesnt' pay, don't use it."

# New method predicts forming limits for high-strength metals



Surface elongation device that accurately predicts forming limits for high-strength aircraft and missile metals has been developed by Chance Vought Aircraft, Dallas. It consists of male and female V-shaped dies, with the male dies dimpled to various depths. A coupon of metal is pressed between the dies, and pins in the female die press the metal into the dimples.

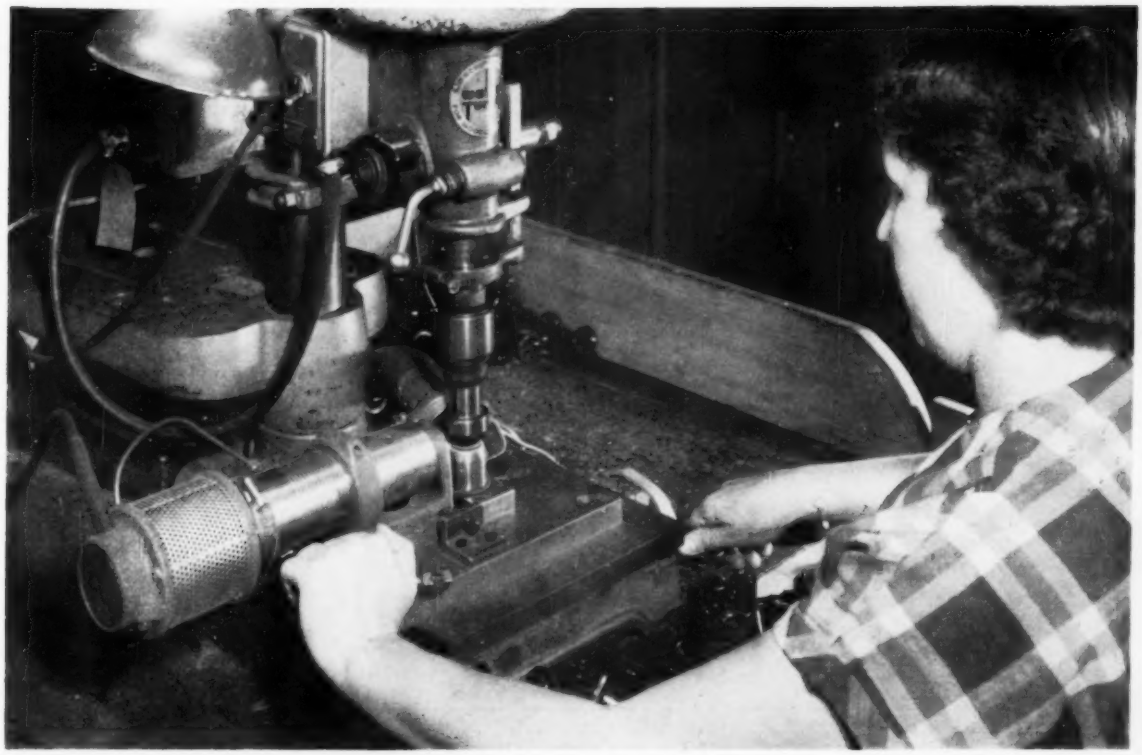
This produces a series of corner beads. Each adjacent bead is progressively deeper, requires more elongation. Difference in each corner bead is so controlled that it needs 1% less elongation than its deeper neighbor so as to form without fracture. Measurement of surface elongation in this way boils down to counting the number of unbroken beads.

The metal coupons do not have to be machined to close tolerances, nor do their edges have to be especially prepared—because all elongation measurements are independent of edge conditions.

Chance Vought used a Guerin-type hydraulic press at maximum operational speed (a semi-skilled operator can test 40 to 60 coupons per hour of such alminum alloys as 2024-0, 5052-0, 6062-0, 7075-0, and 7075-T6; FS 1-0 magnesium alloy; and 4908 and 4901 titanium).

Two sets of dies cover all production run sheets of metal. One tests sheet 0.010 to 0.040 in. thick; the other sheet 0.050 to 1 in. thick. Tempers, as long as they are within the press's capacity, do not affect the test. As for finishes, all of the alloys in raw stock forms have been tested.

Chance Vought's E G Freemon, manufacturing research engineer who worked out the new method, claims tests show the device can accurately predict limits for forming titanium without rupture—something that can't be done by cup-testing or indexing of physical characteristics. Patent has been applied for on this method, which will later be licensed by Chance Vought.



**1 . . . Milling annular grooves in plastic electric plugs**

***They're inexpensive, easy to mount, add tremendous flexibility to existing equipment. That's why more and more shops today are performing a wide variety of precision machining jobs and . . .***

# Tricks with high-speed power quills

BEN C BROSHEER, associate editor

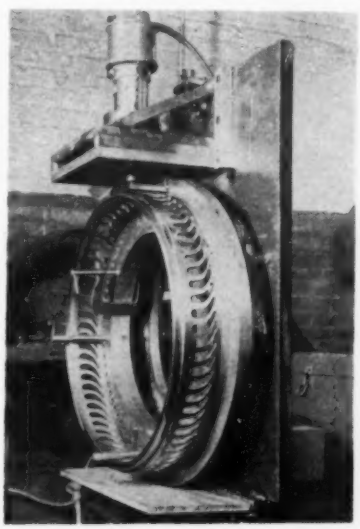
A versatile tool is the power quill: it can do detailed precision drilling and reaming. It can precision mill, grind and polish with coated abrasive tools, with bonded grinding wheels, or with either HSS or tungsten carbide routing cutters, or with machine-ground burrs.

The inexpensive, easily mounted power quill can be held at any required position, in fixed or adjustable mounts. It can be employed as a supplementary spindle to perform additional operations on a conventional machine tool. Or it can be used as a power source for machining on special jigs and fixtures.

Not only that, grinding at speeds of 30,000 to 45,000 rpm with small precision carbide burrs often results in better work at less cost than can be accomplished with mounted bonded-abrasive shapes.

All of the examples shown on these pages were done with high-speed quills made by Precise Products Corp, Racine, Wis. Similar work is being done at other plants with power tools available from other manufacturers. But they have one thing in common—they do the job cheaply and well by using power tools with the utmost ingenuity.

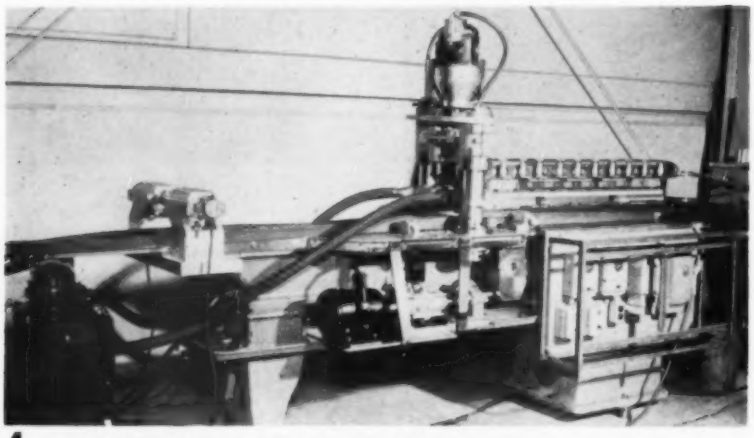
Milling of small annular grooves in plastic electric plugs (see Fig. 1) is done at Arrow-Hart Hegeman Electric Co's plant with an inexpensive setup on a Walker-Turner bench drillpress. The operator's right hand moves the drill spindle down to contact a friction drive head on top of the plastic workpiece in a ball-bear-



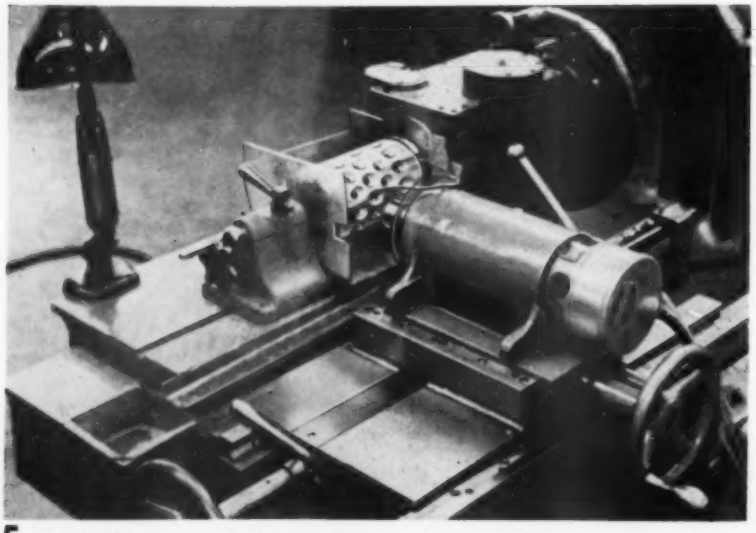
**2 . . . Rough and finish grinding slots in stainless**

Tricks with high-speed power quills . . .

**3 . . . Truing milled slots to within 0.001 in.**



**4 . . . Finish-milling rocket launcher parts**



**5 . . . Milling rotary die for processing machine**

ing fixture. This causes the piece to revolve.

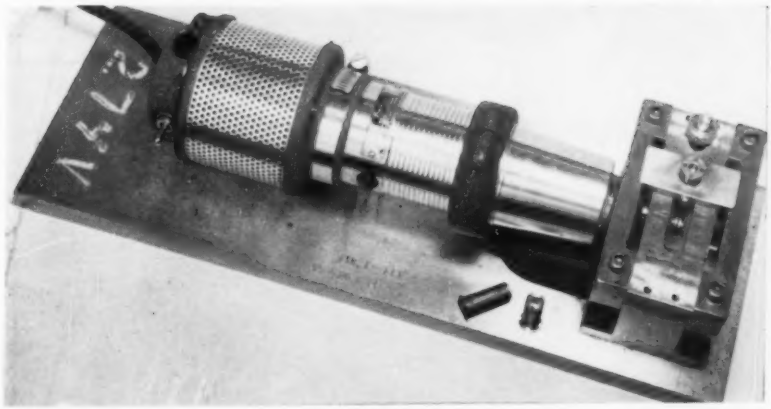
Operator's left hand then feeds the horizontally mounted Precise Super-50 power quill forward against a positive stop, so that the ⅛-in.-dia, 4-flute solid carbide end mill cuts the required groove. This arrangement eliminates need for expensive split molds—and results in a superior, inexpensive product.

As shown in Fig. 2, airfoil slots in a high-nickel stainless steel turbojet engine shroud can be rough and finish ground with solid carbide burrs in a special fixture developed by Delta Corp. The 45,000 rpm, ½ hp power quill is mounted vertically in a slide that allows full float in any direction horizontally. After slots are roughed from the solid in a horizontal mill, the shroud ring is located in this fixture.

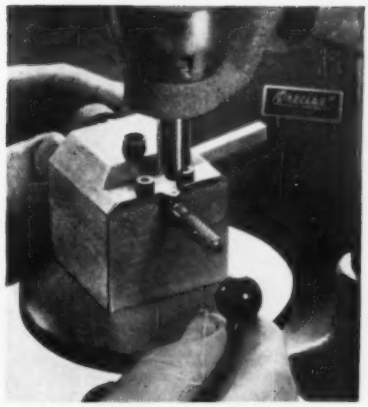
Then the slots are rough ground with a carbide burr which has a shank 0.010 in., larger in diameter than the cutting edges. This shank follows a hardened guide templet as the quill is moved around the outline by hand. In this way the cutter leaves about 0.005 in. of stock for removal by the finishing cutter, which has a shank of the same diameter as the cutting edges.

Slots are held to a tolerance of ± 0.002 in. on all points of contour after finishing with the second cutter. Shroud wall is 0.250 in. thick.

Chicago's Delta Corp also employs a ½ hp, 45,000 rpm power quill to true milled slots to within 0.001 in. of required position in a stainless steel turbojet engine part (Fig. 3), using carbide burrs. Because of the



**6 . . . Cross-slotting valve plunger faces**



**7 . . . Quill and drillpress**

burr's high speed, thin sheet is not distorted under cutting pressure—as it would be with conventional milling cuts.

In this setup, the work is mounted on a precision rotary table. The power quill is in an adjustable mount that is clamped to the upright column of a horizontal-bar boring machine.

Fig. 4 shows two opposed, horizontally mounted 45,000-rpm. ½-hp power quills mounted at the end (left of photo) of a home-made milling machine at Hughes-El Segundo. Setup finish mills two sides of 6-ft-long rocket launcher parts, employing 2-flute, 3/16-in. dia carbide end mills. Stock removal is 0.050 in. during the 15 second cutting cycle—after the parts have first been roughed with vertical spindles in a bridge mount at the center of the machine base ( an old lathe bed).

Tool life was tripled and production time cut 31.5 hours in milling a rotary die for a special processing machine from 24S-T extruded aluminum alloy tubing (Fig. 5), employinging 3/16-in. dia stepped end mills. R P Scherer Ltd, Toronto, used Precise's Super 80 adjustable-speed, ½ hp quill, which has a 7000-to-25,000-rpm speed range. The quill is held in a slide-base mount for precision depth adjustment.

The job was done previously with a belt-drive, 3200-rpm spindle. Sequence of operation: (1) cavity shapes are milled to size from drilled holes, (2) milling is done around cavities to form precision land width and step depth, and (3) excess material is cleared out from between the cavities.

A special milling fixture developed by the Skinner Chuck Co (Fig. 6) for cross-slotting bottom faces of solenoid valve plungers has a ¼-hp, 45,000-rpm power quill in a fixed mount. Solid carbide slotting cutter is ¾ in. dia.

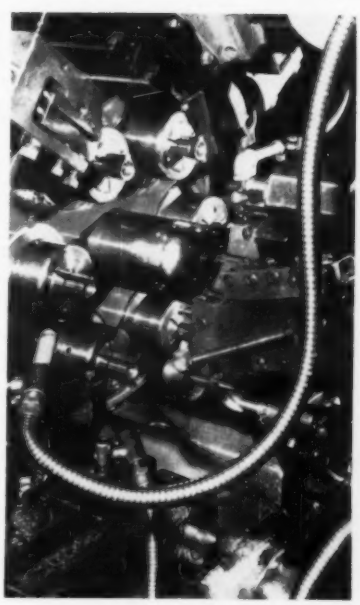
At Skinner, the operator inserts the part in the fixture, moves it with light pressure across the cutter (but doesn't release it), then places the part in a special tray.

Production rate now averages 710 parts per hour, compared with 550 per hour when parts were slotted in a conventional duplex gang milling fixture. Setup, clamping and unclamping operations are eliminated.

Drill life during the operation shown in Fig. 7 was increased 20 times at Olson Bros Co, Plainville, Conn, by employing a 45,000-rpm, 1/5-hp spindle in a vertical drillpress instead of a conventional bench drillpress. Olson uses the quill and drillpress to drill four 0.0124-in.-dia holes in small nickel-silver parts for gyro control unit. Until then, only three to five parts (12 to 20 holes) could be drilled before the drill broke, because of belt vibration. Now, average drill life is 100 pieces (400 holes).

# Extruded bars are half-formed gear rings

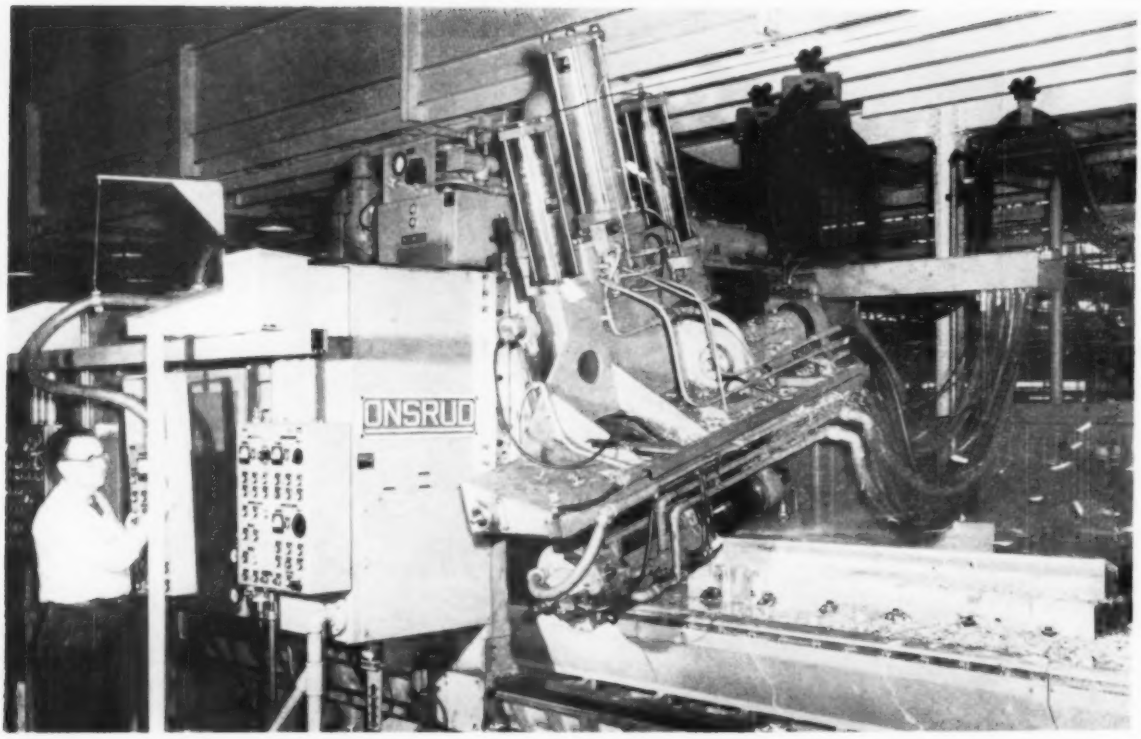
Machining time on split clamping rings for fuel injection pumps has been cut 22% and costs have been chopped 18% by employing extruded C1144 bars produced by Jones & Laughlin instead of standard C 1118 bar stock.



### External machining reduced

All external machining except gearcutting has been eliminated, and the rings have been made stronger —even though they are still of the same dimensions.

Bars are clamped in special collets on a six-spindle Acme-Gridley automatic, where they are drilled, chamfered, and cut off ⅜ in. wide. Then 15 gear teeth are produced, a lockscrew hole is drilled and tapped, and the collar is split at a miller. The new shaped stock has eliminated two milling and one grinding operations at American Bosch Arma Corp, Springfield, Mass.




**Spar mill has modular table . . .**
Largest spar miller built to AIA standards has seven 3x15-ft table sections, and more can be added if necessary. Unit machines 44-ft spar rails and fuselage longerons, and can contour integrally stiffened skins with full crossover arbor

# Tooling and Technique Build

**$3¼ million worth of machine tools and 1 million sq ft of floor space are combined with engineered tooling and specialized fabricating methods to produce parts and assemblies for the Convair model 880 commercial jet transport. Outstanding features are here described by A E Hill, works mgr, plant No. 1, Convair Div, General Dynamics Corp, San Diego, to . . .**

GEORGE H DE GROAT, associate editor

Tooling methods for the model 880 jet transport are new but not untested, because many of them were worked out recently for the F-102A jet interceptor (AM—May 19 '58, p105). Both planes have thin swept wings in which every available cubic inch is fuel tank. An outstanding technique for assembly, which combines adhesive bonding and riveting, was developed to make the wings leakproof and also to increase strength and resistance to fatigue.

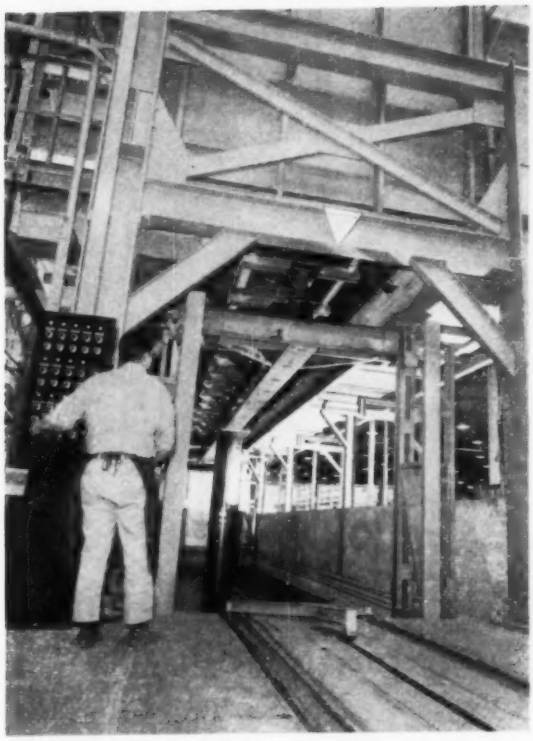
Wing skins, bulkheads, spars, and stringers for the 880 are joined with MMM "Scotchweld" adhesive film between mating faces. These parts are clamped under 100-psi pressure in assembly bucks, then drilled for rivets. Pressure keeps dirt and chips out of the joints, so the parts need not be separated later for final cleaning.

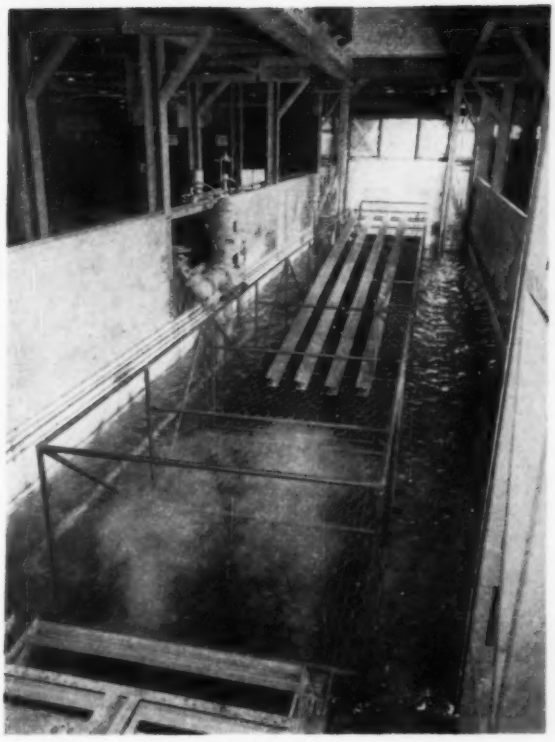
A special bonding facility prepares wing parts for bonding by putting them through degreasing, Oakite etch, rinsing, Alodine chemical coating, rinsing, oven drying, and spraying with Scotchweld prime coat. Then the wings are assembled on six fixtures, three for left-hand, three for right-hand wings. The bucks are 90 ft long, 10 ft wide, and 22 ft high; and they hold the shaped wing skins in place with contoured lift bars. Strips of the bonding tape are inserted during assembly, and are cured in 80-ft ovens at 320 F.

Assembly is vertical, with leading-edge spars at the bottom, and the wings built up past two work-platform levels to full 8x35-ft wing size. Parts added include separating bulkheads that divide the wings into four sections, and truss bulkheads that allow fuel flow but prevent violent surges when the aircraft goes through maneuvers.

### Special Equipment

New machines for model 880 production include an expandable Onsrud spar mill, the largest to date built to AIA standards. It has a 105-ft table that can be extended with 15-ft bed sections when required. It already has great cutting versatility, with two carriages. One carries four heads, all with independent cam control; two with three-





**Up for hot; down for cold . . .**
Three-level conditioner heat-treats and quenches 40-ft aluminum extrusions with minimum time loss between operations. Electric car mover brings in work carrier, then hydraulic lift raises it into overhead furnace. Time cycle is 30-60 min to rise to 860-920 F, then an hour soak. Load must be lowered into quench tank below in 10 sec, and has been done in 6.5 sec. Solution treatment prevents intergranular corrosion

# 880 Jets

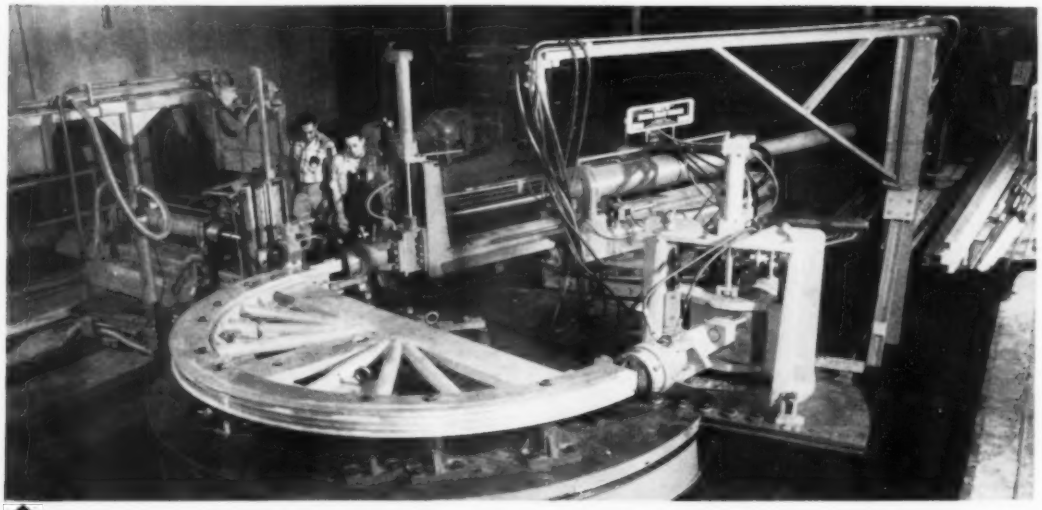
dimensional motion, and two with two-dimension motion. The second carriage had a vertical and a horizontal head, both with three-dimensional control. The machine was designed so numerical tape control can be added later.

The Onsrud machine was built specifically for aircraft aluminum, and is fitted with cutters that are interchangeable with smaller spar mills in the plant. Another contour-milling machine is an Arrow profiler that is fitted with a "True Trace" hydraulic templet follower at a 1:1 ratio. This is manually operated to produce complex spar contours.

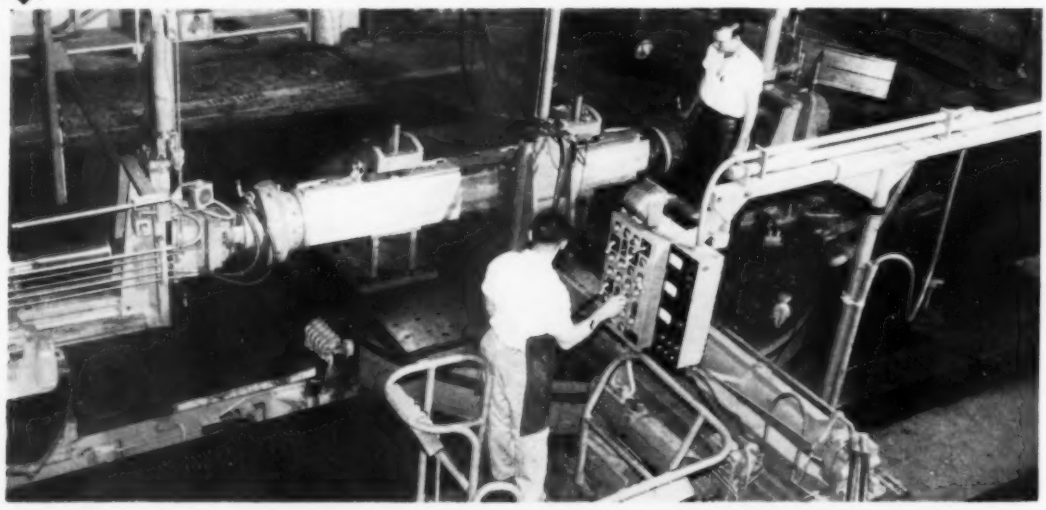
Among other specialized equipment in the new layout for 880 jet:

- Despatch heat-treat and quick-quench oven that solution-heats long aluminum beams and drops them to room temperatures within 10 sec after they leave the oven doors
- Refrigerator room that takes the same 40-ft beams down to —20 F and holds them in completely pliable

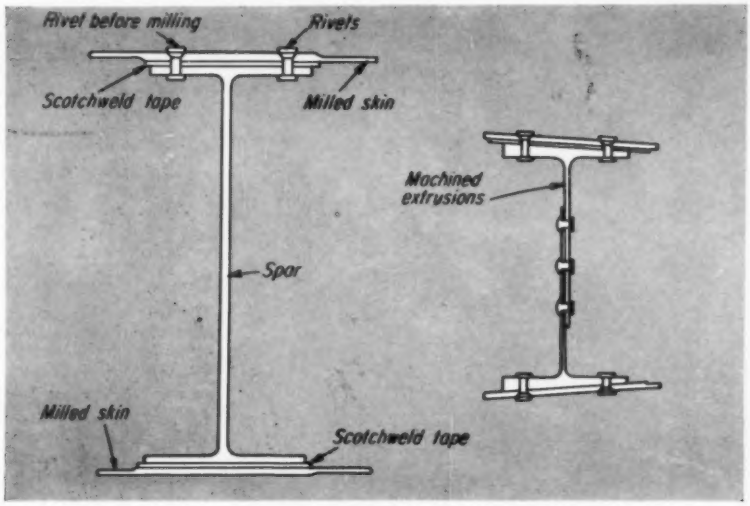
**A freezer as big as a box car . . .**
20-below-zero treatment keeps 75S aluminum extrusions pliable so half-circle belt frames can be formed from straight 40-ft beams



**Two jobs for a radial draw former . . .**
75-ton Cyril bath machine draw forms aluminum H-beams into 12-ft half circle for fuselage belt frames (above). With T-shaped structural part gripped by two jaws, additional 35-ton ram irons stock flat against die (below)



**Gripped for rivets . . .**
Quick-acting clamps hold parts for a wing truss in position for riveting. Truss is a bulkhead through which fuel will flow freely inside wing



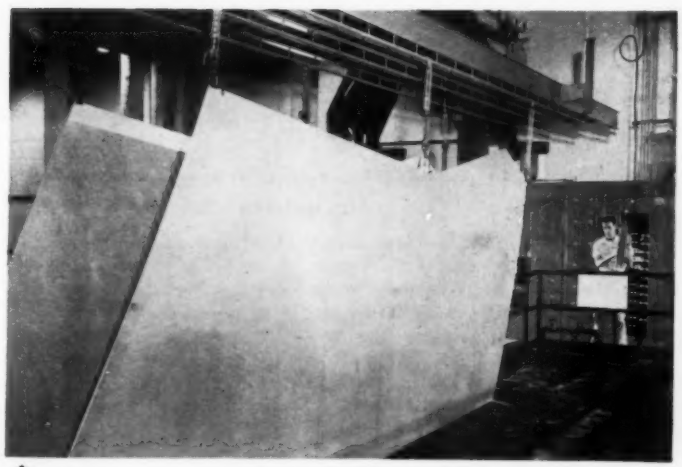

**Fuel-tight joints . . .**
Modified countersunk rivets clamp adhesive-lined seams to hold aircraft fuel in integral wing tanks. Mating surfaces are cleaned, then treated with Alodine 600 and Scotchweld prime before AF-10 adhesive film is added. Rivets (patented by Convair) and adhesive technique prevent leaks

condition until they can be formed

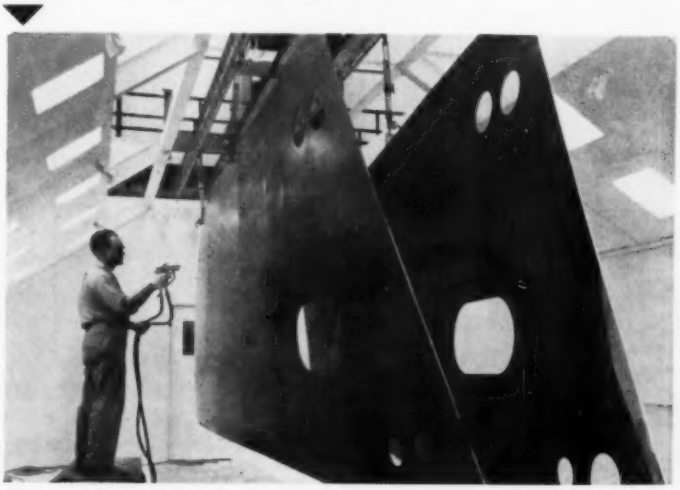
- Cyril Bath radial draw former built to Convair specifications, with 75-ton tension capacity and a secondary 35-ton compression ram for ironing sheets flat
- Gantry-mounted drill that rolls along rails beside wing spars and drills rivet holes through templets. The drill feeds automatically, controlled by templets
- Special clean workholders for small parts to be bonded into wing assemblies, including white gloves for operators to prevent fingerprint smudging
- Quick-change cleaning and rinsing tanks that empty in 6 min and refill in another 6 min. Feeder pipes are air-blown to remove all traces of previous solutions, which may be soap rinse, Alodine chemical, or steam. Tanks can take two 53-ft spar rails at once.

Wing panels are made fuel-tight and corrosion-resistant by double assembly—bonded seams plus special rivets. First all parts, skins, spars, and small parts, are degreased, deoxidized, and rinsed several times. They are dipped in Alodine 600 for 30 sec, which produces a chemical conversion coating that bonds the Scotchweld prime coat to the parent metal. Parts are dried thoroughly, then the Scotchweld prime is sprayed on.

As the panels are assembled in riveting fixtures, dry strips of Scotchweld tape are sandwiched between mating metal surfaces. Rivet holes are drilled, then rivets are added. These are special fasteners modified from the Straylor design (patented by Convair) to hold bonded joints. Each rivet is countersunk without a washer.



**Technique makes the bonds good . . .**
Wing skins are oven dried at 175 F for 15 min after Alodine dip (above). Safety doors on oven are automatically timed to open and close for workholding fixture. Finally, Scotchweld prime is sprayed on in a downdraft, filtered booth (below). Panel will be air dried, then baked at 150 F for 30 min, and stored until required



**Protective coat is sprayed on . . .** sheets of 6A1-4V titanium prior to heat treating. Coating is basically a soda-boro-aluminate glass (soluble in water) to which is added a formaldehyde resin binder, a suspending agent, and alcohol as a vehicle

# Titanium gets glass coat . . .

## Preparation time is reduced from 30 hours to 1 hour to eliminate time-consuming bottleneck in heat treat.

**SEATTLE, WASH—Titanium sheets are now being protected from contamination by a water-soluble glass coating that is sprayed on before the sheets go into the heat-treating furnace. After quenching, the coating is quickly removed with a caustic soda solution.**

The new technique was developed by Manufacturing Research and Engineering Process engineers at Boeing Airplane Co in an effort to solve the problems created by an earlier spray-coat process for protecting titanium.

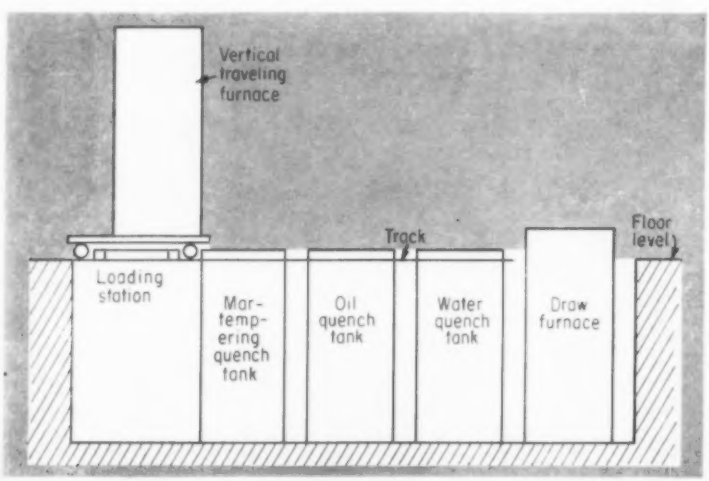
The metal has such a strong tendency to pick up contamination from the atmosphere at elevated temperatures that some form of sprayed-on protection is almost a necessity to seal off the titanium surface from any outside contact while it is being heated.

The earlier method employed an aluminum-silicone paint that required a long drying period and very careful handling before going into the furnace. After processing, the paint was often difficult to remove.

### Improved process

The new material is essentially a water-soluble glass in powder form which is added to a binding agent and then held in suspension in a liquid. In application, a titanium sheet is simply given two or three spray coats that look like white paint. After this, the sheet is ready to be put directly into the heat-treat furnace—an elapsed time of one hr instead of 30 hr. During heat treat, the organic materials burn off, and the glass fuses at 1450 F. After being quenched, the titanium sheet has a transparent glass sheath that can be removed with a caustic-soda solution in half the time previously required for the aluminum-silicone paint.

In addition to this new technique, Boeing has further simplified the heat treating of titanium by installing one of the largest traveling furnaces in the country. Built by E F Houghton & Co, Philadelphia, the line consists of a pit-type loading station, a traveling furnace, three vertical, floor-level quenching tanks, and a partially recessed draw furnace. The traveling furnace has a charge space 14 ft high and 5 ft in dia. Three 105-kw heaters provide three-zone heating.



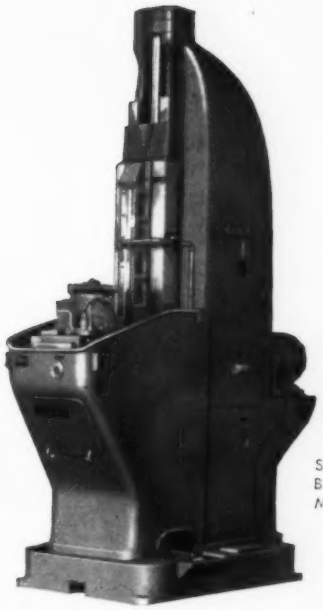

**Traveling furnace treats large parts . . .** with minimum distortion, complete quench control, and considerable saving in floor space. Maximum work load in furnace is 4000 lb at 1600 F or 1000 lb at 2050 F

# FOOTBURT

***a faster***

**MORE ECONOMICAL**

***machine operation***



Single Slide Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

Footburt Surface Broaching may be the answer to your problem of faster machining. Many jobs that were slow and expensive when handled by conventional machining methods are now being produced by Surface Broaching. Production in most cases is as fast as the speed at which parts can be loaded. Yet cutting speeds are so low that the cost of tool maintenance shows great savings. Exceptional finish can be maintained. We will gladly discuss your machining problems with you.

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*Write for Circulars No. 503 and 509*

Duplex Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

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# FOOTBURT

**PIONEERS IN SURFACE BROACHING**

# "TRUKUT® increased production 4 times..."

A small Mid-Western machine shop was confronted with an economic problem – production costs were too high – tool life was too short. While engaged in the job of cutting threads on 1020 16-gage electric welded steel tubing, the shop called in Sinclair Representative Raymond F. Ohm for help.

Mr. Ohm reports: "Tool life was a maximum of only 100 pieces before burning took place. Thread was very rough, due partly to chatter because of thin wall of tube."

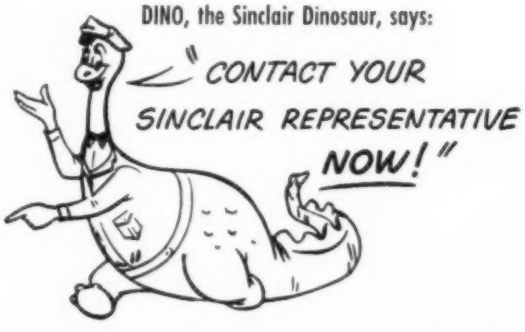
"I recommended Sinclair TRUKUT® EP Soluble Oil, Grade C, because it affords greater emulsion stability, longer tool life and better finishes with close tolerance. It also gives a greater cooling and load-carrying capacity to prevent tool welding and burning."

"With TRUKUT, *production has been increased four times.* Four hundred or more pieces are produced before tool is replaced. Also – finish of threads is finer, and general appearance of the finished piece is better."

"The shop found TRUKUT EP, Grade C, so satisfactory that it now uses TRUKUT exclusively."

If *you* have a problem with cutting or grinding coolants, it will pay you to look into the advantages of Sinclair TRUKUT EP Soluble Oils. Contact your local Sinclair Representative, or write to Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y. *There's no obligation.*

DINO, the Sinclair Dinosaur, says:




**SINCLAIR**

**CUTTING OILS and COOLANTS**

American Machinist
REFERENCE BOOK SHEET

# True-Position Tolerancing—IV

WALTER H HARRINGTON,
engineering standards coordinator,
Research and Advanced Development Div,
AVCO MFG CORP, WILMINGTON, MASS.
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In Fig. 8, the basic dimension bolt diameter is untoleranced. True-position tolerance controls angular location of the holes as well as the bolt-circle diameter. True position of each hole in Fig. 8 *A* is determined from basic bolt diameter and basic angular relationship established by the drawing note and symbol. The symbol means that all holes are to be located within a tolerance of 0.010 true position diameter. In Fig. 8 *B*, true position of each hole is determined by basic angles and radii. Note that this part contains holes of different diameters and holes located within different positional tolerances.

A true-position tolerance zone is defined in Fig. 9. The circle in the center represents the true-position tolerance diameter or zone in which a center may vary in any direction from true position or exact center. The three outer circles represent three possible holes shown at their minimum hole diameter with centers located within the circular tolerance zone. As long as this maximum material condition is maintained in all mating parts, interchangeability is assured.

True-position tolerance not only applies to the surface location of holes, both linear and angular, but also controls the axial runout of the hole. As shown in Fig. 10, axial runout cannot exceed the true-position tolerance called for in the symbol.

## FAILURE TO EXPRESS INTENT

In the past, locations have customarily been given on drawings

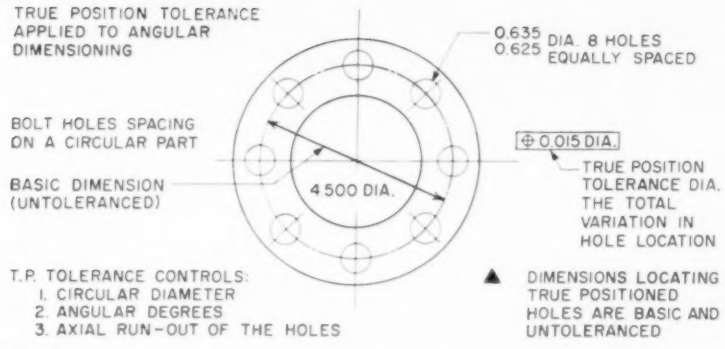

TRUE POSITION TOLERANCE APPLIED TO ANGULAR DIMENSIONING
0.635
0.625 DIA. 8 HOLES EQUALLY SPACED
BOLT HOLES SPACING ON A CIRCULAR PART
⌖ 0.015 DIA.
TRUE POSITION TOLERANCE DIA. THE TOTAL VARIATION IN HOLE LOCATION
BASIC DIMENSION (UNTOLERANCED)
4.500 DIA.
T.P. TOLERANCE CONTROLS:
1. CIRCULAR DIAMETER
2. ANGULAR DEGREES
3. AXIAL RUN-OUT OF THE HOLES
▲ DIMENSIONS LOCATING TRUE POSITIONED HOLES ARE BASIC AND UNTOLERANCED

FIG. 8

## POLAR CO-ORDINATES

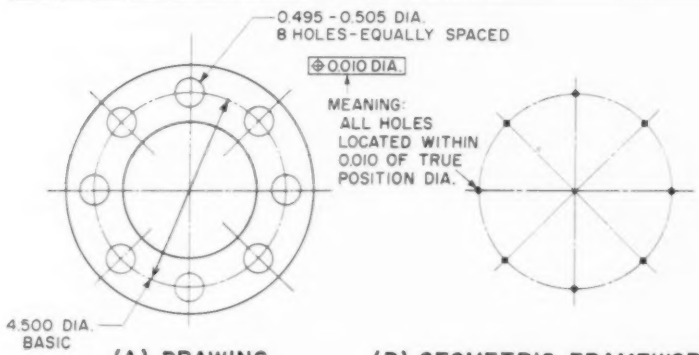

0.495 - 0.505 DIA.
8 HOLES - EQUALLY SPACED
⌖ 0.010 DIA.
MEANING:
ALL HOLES LOCATED WITHIN 0.010 OF TRUE POSITION DIA.
4.500 DIA. BASIC
(A) DRAWING
(B) GEOMETRIC FRAMEWORK SHOWING TRUE POSITION OF HOLE CENTERS

FIG. 8A

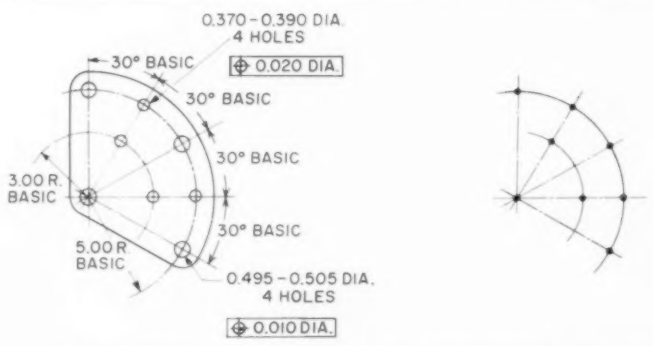



FIG. 8B

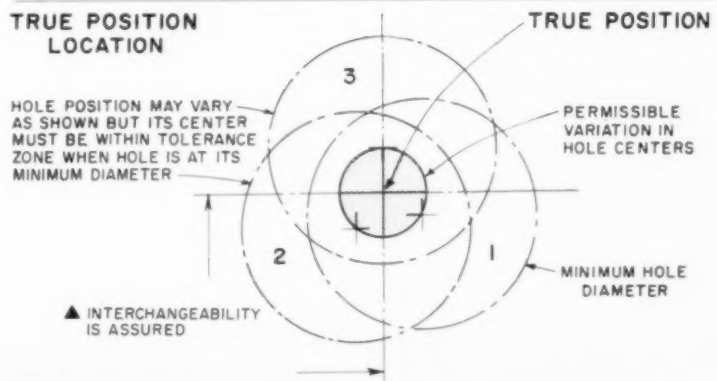
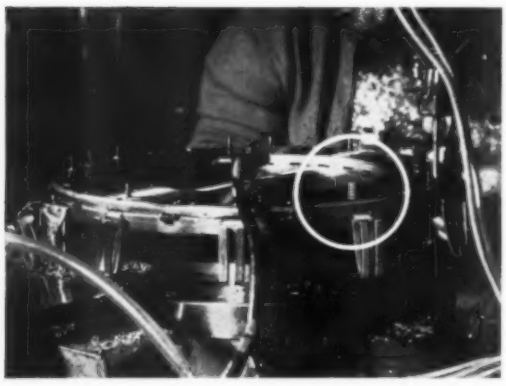

TRUE POSITION LOCATION
TRUE POSITION
3
HOLE POSITION MAY VARY AS SHOWN BUT ITS CENTER MUST BE WITHIN TOLERANCE ZONE WHEN HOLE IS AT ITS MINIMUM DIAMETER
PERMISSIBLE VARIATION IN HOLE CENTERS
2
1
MINIMUM HOLE DIAMETER
▲ INTERCHANGEABILITY IS ASSURED

FIG. 9

# Practical Tooling Tips

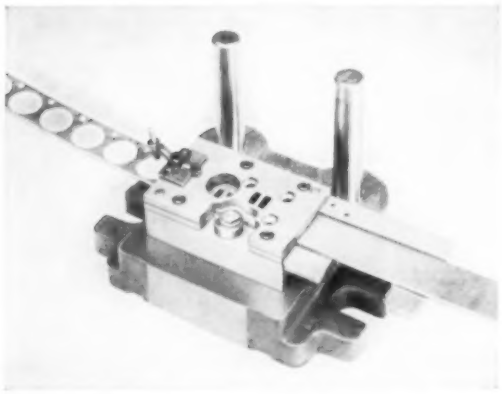
*No. 3 of a series*

Are your tool makers wasting time making complicated tooling gadgets when a standard, off-the-shelf Vlier part could do the job much better? Why not examine your present drawings and see where these simple, low-cost parts can be used. You will be amazed at the savings possible.



**PRODUCTION INCREASED 300%** when this 12-station automatic indexing and tapping fixture was put to work. Vlier Spring Plungers allow the operator to load by simply pushing the part into a slot. These simple, spring-loaded tools also position the part for the tapping operation. Available in four models; fifty sizes.

**NEW SWIVEL PAD-TORQUE THUMB SCREW** combines the Vlier Torque Thumb Screw and Swivel Pad Clamp. The result is a perfect holding tool—one that applies only the right amount of holding pressure without damaging the finished surface. Unique ball joint construction of the pad permits adjustment to off-angle surfaces.



**PROPER STOCK ALIGNMENT IN PROGRESSIVE DIES** becomes a simple task with the new Vlier Stock Pusher. Saves pilots. Mounts in tapped hole. Accommodates stock as thin as .010"; width variations totalling 1/16". Nothing to wear out or foul up.

**NEW 1958 CATALOG NOW AVAILABLE**—Eight pages; completely revised. Includes information and specifications on all new Vlier products, including the Torque Handle, Stock Pusher, Leveling Pad. Makes ordering easy. Suggests new uses for these proven time-savers. Write for your copy today!

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# True-Position Tolerancing—V

by means of rectangular or polar coordinates, each with its own tolerance. Such a method often fails to express the engineering intent fully or correctly. Direct tolerances, as shown in Fig. 11, allow variation in the direction indicated by the dimension lines. The result is a square tolerance zone (Fig. 12) with its corners farther away from the desired position than the tolerance implies. Because variation of the actual location may occur anywhere in the square, the maximum allowable variation from the desired location occurs at 45° from the horizontal or vertical direction in which the tolerances are indicated. Therefore, the tolerance on the dimension must be less than is truly allowable. Actually the positional tolerance area as defined by the center distance limits is an inscribed square of the positional tolerance circle.

If four holes are located with respect to each other, as in Fig. 13, it would seem that the ordinary interpretation of the toleranced center distances would show the actual center of each hole to be located within its respective tolerance square, Fig. 14.

If one hole is specified as a datum, the actual center of each hole with respect to this datum would lie in the areas shown in Fig. 15. However, because of the squareness tolerance either expressed or implied, the holes may be located in the manner shown in Fig. 16.

A common specification for holes around a bolt circle, positioned with respect to a slot, is shown in Fig. 17. Polar coordinates are given, each with a tolerance, as well as a bolt-circle diameter. The interpretation of the dimensions as shown here means that the center of each hole will lie within an annular

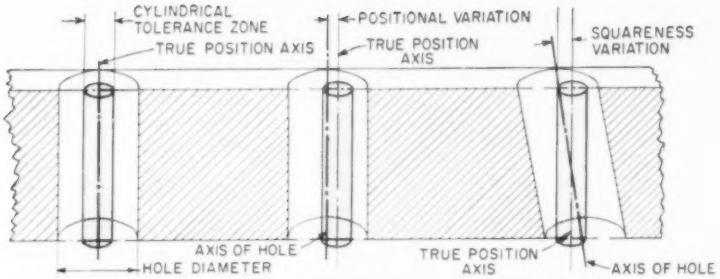

CYLINDRICAL TOLERANCE ZONE
TRUE POSITION AXIS
POSITIONAL VARIATION
TRUE POSITION AXIS
SQUARENESS VARIATION
AXIS OF HOLE
HOLE DIAMETER
TRUE POSITION AXIS
AXIS OF HOLE
(A) AXIS OF HOLE IS COINCIDENT WITH TRUE POSITION AXIS
(B) AXIS OF HOLE IS TO THE LEFT OF TRUE POSITION AXIS BUT WITHIN TOLERANCE ZONE
(C) AXIS OF HOLE IS INCLINED TO MAX. POSITION WITHIN TOLERANCE ZONE

FIG. 10

## CENTER DISTANCE LIMITS USING RECTANGULAR COORDINATES

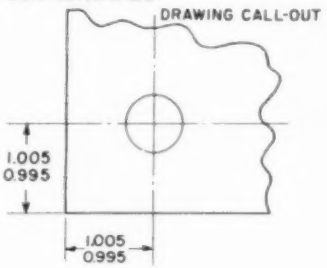



FIG. 11

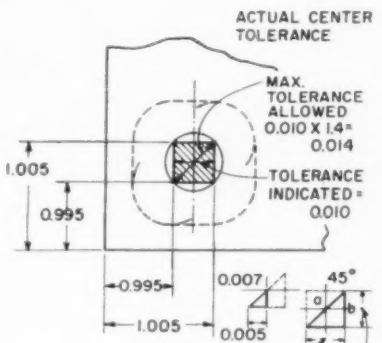



FIG. 12

a = b x COSEC 45°
a = 0.014

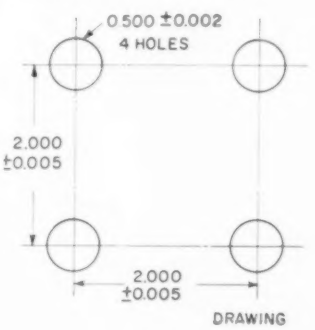



FIG. 13

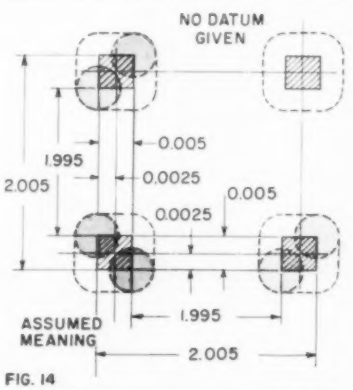
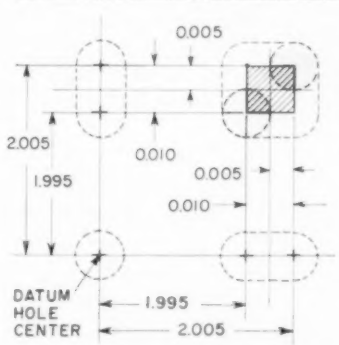
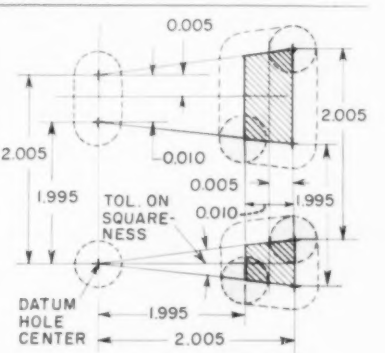



FIG. 14



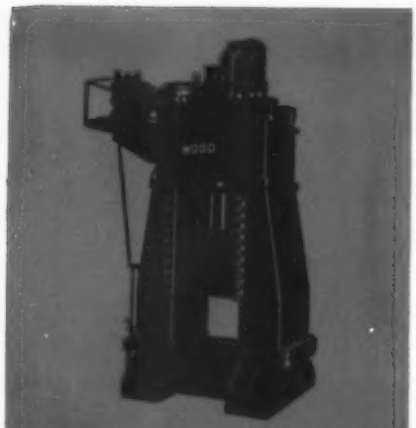

WHAT WE EXPECT TO HAPPEN WITHIN A 0.010 TOTAL TOLERANCE

FIG. 15




WHAT COULD ACTUALLY HAPPEN & STILL BE WITHIN THE 0.010 TOTAL TOLERANCE

FIG. 16



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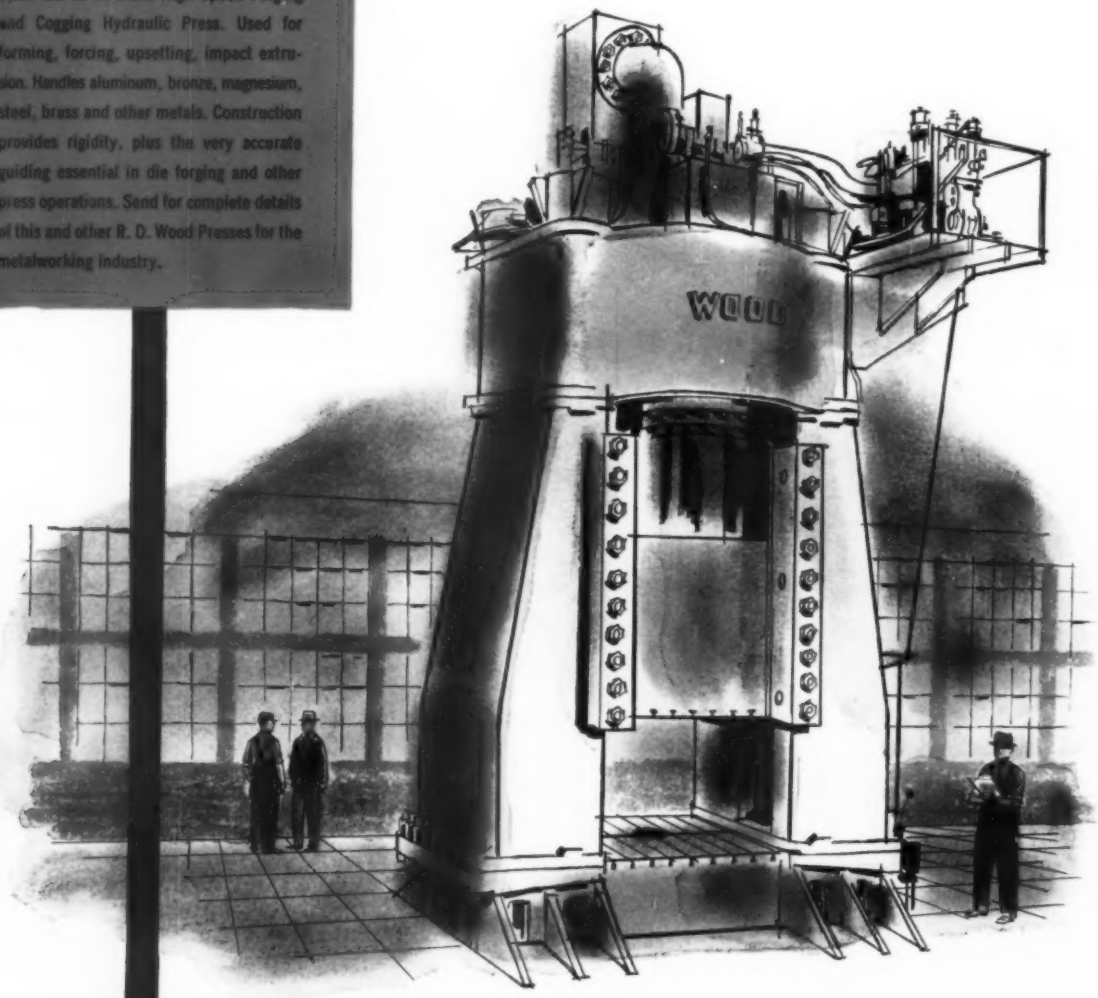
For proof, look at production records—and downtime for maintenance. Then watch an R. D. Wood Press at work. See for yourself the smooth, precise operation—the dependable performance—even under tough conditions. Finally, inspect an R. D. Wood Press up close. Notice the soundness of design, the excellence of materials, the scrupulous care given to each detail of construction. These are the reasons why R. D. Wood Presses have been the standard of excellence throughout the metalworking industry.




**R. D. WOOD COMPANY**

PUBLIC LEDGER BUILDING • PHILADELPHIA 5, PENNSYLVANIA

# True-Position Tolerancing—VI

sector, 0.010 in. by 2°. It is difficult to determine whether a given part made to these tolerances will mate satisfactorily with its corresponding part, even though both are within the stated tolerances, Fig. 18.

### CIRCULAR TOLERANCE ZONE VS. SQUARE TOLERANCE ZONE

In the coordinate system of square tolerancing, the maximum tolerance is found across the corners of the tolerance zone only (see Fig. 19). In this system, we must resort to small tolerances to maintain interchangeability of parts. In the true-position, circular-tolerance-zone system, the maximum tolerance is maintained in all directions within the circular zone. True position actually circumscribes the square, thus allowing a larger area in which to locate centers. Parts which otherwise might be rejected by inspection under the coordinate checking system now may be accepted by the use of true-position tolerancing.

Fig. 20 shows the hole and true-position circular zone in which all possible centers must be located in order to maintain interchangeability of parts. The two systems of tolerancing are compared in Fig. 21*. In the coordinate system, location of the holes is controlled by high and low limits. In true positioning, locating dimensions are basic and controlled by true position tolerance symbols.

True-position tolerance is used in special cases of interchangeability, keeping the tolerance under 0.020 in. total. If larger tolerances are needed, the system of title-block tolerances is employed. All title-block tolerances are automatically superseded where dimensions are controlled by the true-position tolerance indicated by the word "Basic" under the locating dimensions.

*To be published with next installment.

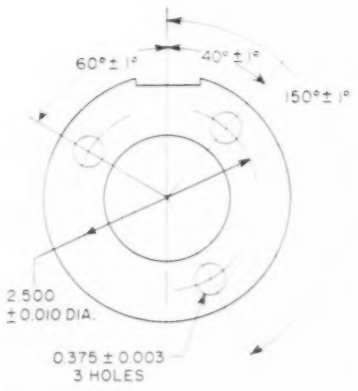



FIG. 17

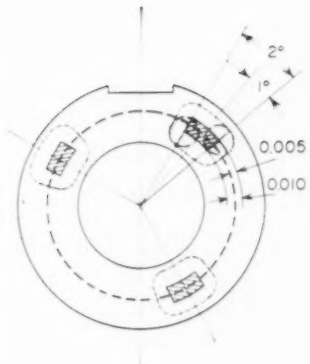



FIG. 18

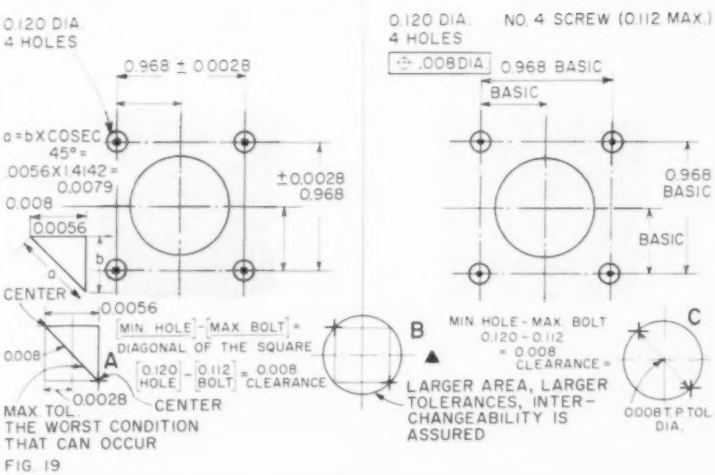



FIG. 19

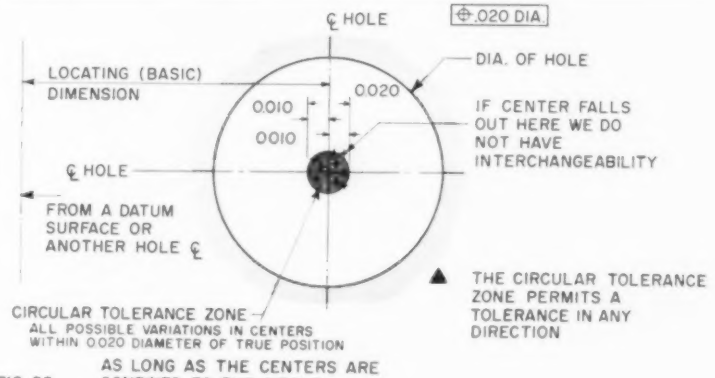
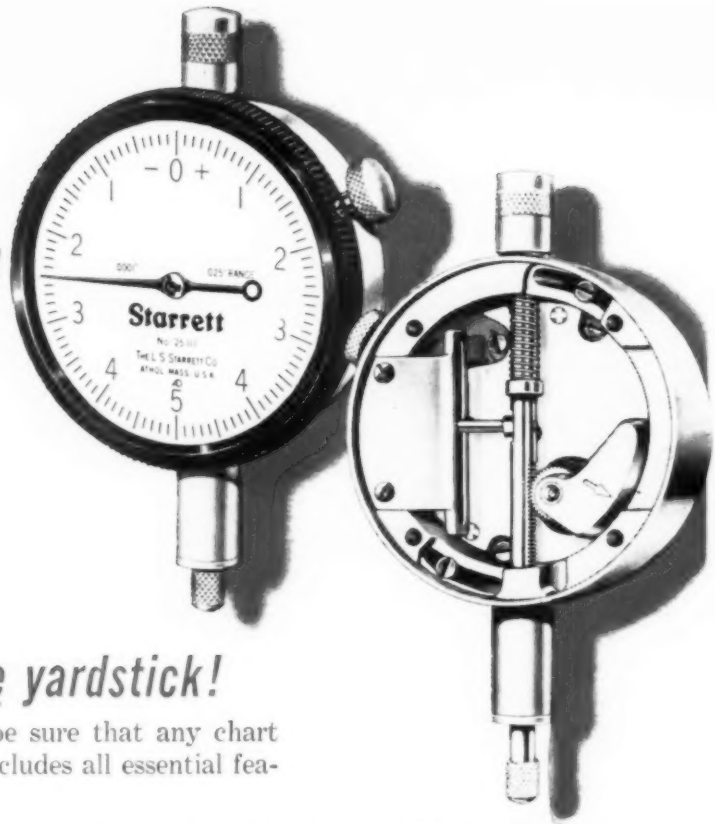

℄ HOLE
.020 DIA
LOCATING (BASIC) DIMENSION
DIA. OF HOLE
0.020
0.010
0.010
IF CENTER FALLS OUT HERE WE DO NOT HAVE INTERCHANGEABILITY
℄ HOLE
FROM A DATUM SURFACE OR ANOTHER HOLE ℄
THE CIRCULAR TOLERANCE ZONE PERMITS A TOLERANCE IN ANY DIRECTION
CIRCULAR TOLERANCE ZONE
ALL POSSIBLE VARIATIONS IN CENTERS WITHIN 0.020 DIAMETER OF TRUE POSITION

FIG. 20 AS LONG AS THE CENTERS ARE CONFINED TO THE CIRCLE INTERCHANGABILITY IS ASSURED

# By all means COMPARE dial indicator features...




## *but use an accurate yardstick!*

In comparing dial indicators, be sure that any chart you may be asked to look at includes all essential features properly evaluated.

**GEAR HARDNESS** Extreme hardness, particularly if it results in brittleness, is undesirable. The Starrett standard for gearing has an ideal combination of hardness and toughness to prevent pivot breakage.

**RUSTPROOF** Of major importance is the material from which gears, pinions, racks and spindles are made. In Starrett indicators, stainless steel is used to make the entire unit rustproof.

**JEWELED BEARINGS** Bronze bearings are good but jeweled bearings are better for superior sensitivity and low friction. All Starrett dial indicators are available with either jeweled or plain (inserted bronze) bearings.

**REMOVABLE BEARINGS** Not only are bearings removable, but in Starrett dial indicators the entire gear mechanism is interchangeable, making Starretts the simplest and easiest to maintain.

**SHOCKPROOF** All regular models available with NONSHOCK mechanism. For less severe applications, models without NONSHOCK mechanism but with bronze or jeweled bearings are available at *lower* cost.

**SIMPLE CONSTRUCTION** Simple, interchangeable unit construction means fewer repair parts to stock, less maintenance time and lower upkeep cost *plus* longer, more accurate life for all your indicators. The entire gear mechanism is identical and interchangeable in all Starrett No. 25, No. 655 and No. 656 regular and NONSHOCK models.

**BACK DESIGN** Starrett indicator backs have four screws and four screw holes to prevent rocking and to permit positioning the lug at each 90°.

•

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**Visit the Starrett Exhibits — Booth 606, Western ASTE Show — Booth 2546, National Metal Show**

# Talking Shop...

### Inspection Problem

THE MORE THINGS CHANGE, it has been said, the more they remain the same. We were reminded of this when we saw a letter recently that was written by the commanding office of Watervliet Arsenal to the chief of Ordnance. Dealing with the inspection problem at the Arsenal, the letter states, "Different officers will receive or condemn the same shell or shot according to the difference of their judgments. Some will be found upon which judgment will be suspended not knowing whether to receive or reject them, and the same officer will pass at one time a shot that he has before condemned. The Regulations should be so explicit and minute that when instruments are made and adjusted a boy of 12 years of age may inspect and prove every article of iron castings. For instance the Regulations now say that the shells must be of uniform thickness. It can not be supposed that one in 10 will be perfect. It is not practicable. There must be allowances for variations and these allowances above and below precisely limited, but the present regulations do not say how much the thickness of metal may vary without condemning the shell. The Inspecting Officer does not like to establish regulations for himself by which the property of individuals is to be hazarded. It ought not to be required of him and to pass what in his judgment ought to be condemned is to hazard his own reputation." That letter was written on July 27, 1819, by Major Dalliba, first commanding officer of the Arsenal, to Col Wadsworth of the brand new Office Chief of Ordnance. The letter as a whole (we quoted only part) brings out a set of principles that are as valid today as then.

### Frauleins Unite!

USUALLY IT IS ASSUMED that women who own plants have acquired them by inheritence. In Germany, however, there are an estimated 606,000 women who own plants and are active in running them. One third of these started the business themselves. Most of them are small "plants," however, the average employment being reported as five. That still is 3 million people.

### Audio Training

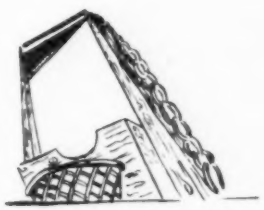
WE DON'T KNOW whether to applaud or deplore the joint efforts of Westinghouse and Dictaphone which will make blueprints and other written instructions unnecessary for many operations. These joint efforts have resulted in something called AIMO —Audibly Instructed Manufacturing Operations. A series of specific instructions for a worker or group of workers is recorded on tape. When the instructions are dictated a button is pressed which puts a signal on the tape. The workman wears a self-contained unit like a hearing aid. Each time he activates the unit he hears the next instruction. He can also reverse the tape to have an instruction repeated. He can also adjust speed, volume, and tone. We applaud the development because of its obvious advantages, especially in certain types of assembly. It should certainly reduce errors in wiring. Our reservations are that if AIMO becomes general, will Johnny ever learn to read—or need to?

### Russians Second

A BULLETIN from one of our World News Bureaus reports that Soviet engineers are using electrolytic action to obtain higher efficiency in grinding carbide. The bulletin then describes a method of grinding virtually identical with our electrolytically assisted grinding (first reported in *AM*—Nov 10 '52, p154). They didn't pick this one up from us as fast as we took electrical discharge machining from them.

## MEMOS

by BESS RITTER



Although it's generally supposed that one of the goriest machines ever invented—the French guillotine—was dreamed up by a man named Dr Joseph Guillotin, this really does the man a considerable injustice, because he was far from a sadistic character.

> **He was known for his kindliness, and although he did know about the machine (which already had been invented by a Dr Louis), Guillotin's name is historically linked with it for this turnabout reason: He constantly kept proposing to the French government that it be made the official death instrument because it was** so much more humane **than any other executionary instrument up to this time. Consequently, when it was adopted, it was only natural to call it the "guillotine" instead of the "louis."**

It is also commonly supposed that Dr Guillotin was the first to die by its blade—but he wasn't; instead, he died peacefully in bed. And his children, who were just as peaceful as himself, made every effort possible to have the name "guillotine" changed, so that the bloody events of the Revolution would no longer refer to them.

> **However, since the machine was far too well known by now for this to be accomplished, they got permission to change their own surnames instead, as the only practical alternative possible.**

# Practical Ideas...

## Milling Machine Pulls Broach

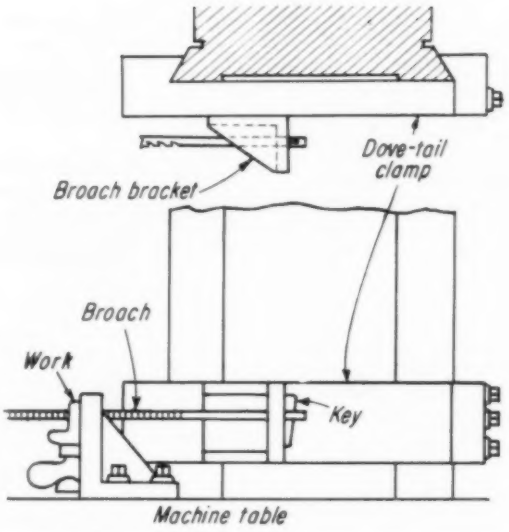
We recently received a short production order that required, in part, broaching a 7/16-in. square hole through a ½ in. thick section of a steel casting. Rather than having a subcontractor do this part of the work, we came up with the idea illustrated at right.

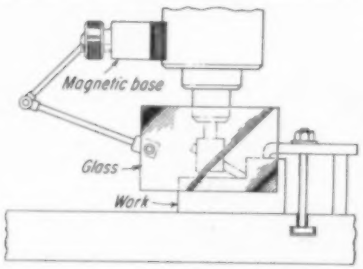
It's a clamp, fabricated from heavy steel plate with jaws to fit over the dovetail ways of a horizontal miller. A reinforced angle bracket welded to the clamp was drilled to receive the broach.

On the miller table we mounted a heavy-duty angle plate which supported a simple work-holding fixture. The broach passed through a hole in the holding fixture to give the workpiece better all-around support.

After lining up the hole in the workpiece with the hole in the clamp bracket, the broach was inserted in the latter and secured with a key. With cutting oil pumped from the coolant system to the broach, the table feed was engaged and the job run off without a hitch.

*W F Melenric, Old Forge, Penna*




## Magnetic-Base Shield Protects Machine Operator

Flying chips are unavoidable in many machining operations, and for that reason safety glasses should always be worn. But, although they give good protection for the eyes, they won't stop chips from clinging to the face or arms, and a hot chip inside the neck opening of a shirt is something of an experience.

A shield near the cutting tool or source of the chips is therefore the best method of stopping chips from shooting in all directions. Protective shields are nothing new, but the trouble has always been in the method of mounting them.

That's why we have made several permanent-magnetic-base shields to be used around our millers and lathes. Low-priced magnetic indicator bases, employing knuckle-jointed links, are used. A hole is drilled in a piece of plain glass and mounted on the end of the links. A rubber washer on each side of the glass prevents breakage. Holes are easily drilled in glass with a piece of copper tubing charged with lapping compound. But go easy on the pressure.

We chose glass instead of plastic because plastic tends to fog when constantly bombarded with hot chips. The sketch shows how the magnetic base is attached to the quill of a vertical miller, and how the glass is adjusted to stop chips. The base is just as easily mounted on the lathe compound or carriage.

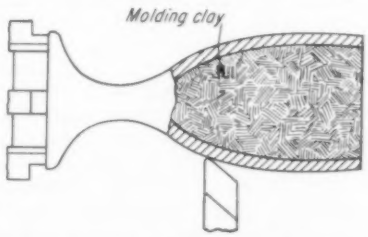
*Barry S Cox, Royal Oak, Mich*

## Paper Protects Chuck and Work

The residual magnetism left in an electro-magnetic surface grinder chuck, after current has been shut off, sometimes makes removal of the workpiece difficult. When the piece is forcibly slid off the chuck, both the mounting face of the work and the chuck itself are likely to get scratched up. The operator's knuckles are also in danger of being skinned when he pulls the work off.

This can all be avoided when a sheet of clean paper is placed on the chuck before the work is mounted. The chuck will hold just as well, and when turned off the work can be removed without a struggle. As a result the chuck is better preserved, work won't be scratched, and no accidents.

*Howard Levy, Brooklyn, NY*



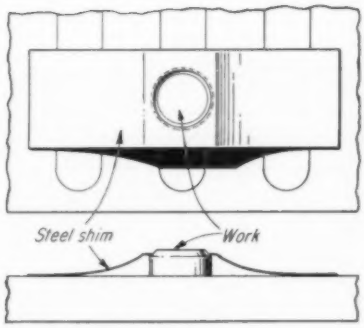

## Molding Clay Eliminates Chatter

We have been experimenting with setups which include internal and external contour turning in No. 2011 grade aluminum. The part shown above is one in particular that we had difficulty in machining because of chatter.

The thin wall stock and the overhang with the small neck diameter were the primary causes for the vibrations. We'd start with roughing out the cavity and finishing it with the internal-contour boring tool. No trouble here; the OD would still be intact and wall thickness heavier.

It was a different story with the external contouring operation. Chatter made it impossible to turn the OD, particularly outside the cavity. However, the remedy was simple. After having finished the cavity we solidly packed it with modeling clay. The inelastic properties of the clay absorbed all vibration and made it possible to finish the part to the required contours.

*Fred Buehler, instruction, Rochester Institute of Technology, Rochester, NY*



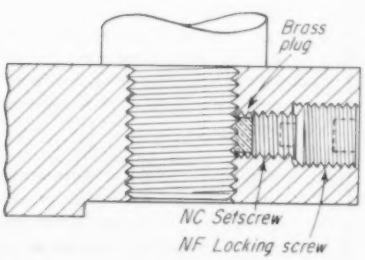

## Shim Stock Holds Aluminum Parts on Magnetic Chuck

We had some thin aluminum guides to make which had to be identical in thickness with a fine finish on one side. The problem was in holding these parts on the magnetic chuck for grinding. We tried tape with adhesive on both sides, but dimensional tolerance and parallelism could not be controlled.

Fortunately, the guides had a bevel on the face we had to grind. This bevel was used to grip the guides around the top edge with a piece of 0.010 in. steel shim stock.

The shim was prepared by first punching a large enough hole through its center to allow the part to protrude but slightly smaller than its diameter. A crease on each side of the hole kept the shim flat below the surface of the part when the magnetic pull drew the shim towards the chuck. This allowed us to grind all guides to the same thickness without a costly fixture.

*William De Groat, Altadena, Calif.*



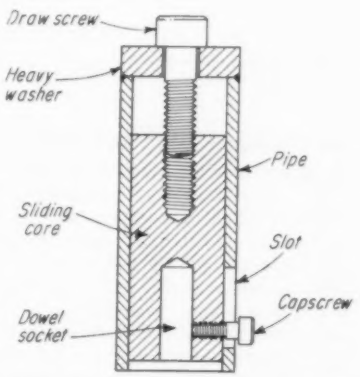

## Setscrew Locked Better By Another of Different Pitch

When a setscrew is employed to secure a component to a plain shaft or the threaded end of a shaft it is best to lock it by following it up with another setscrew. As this is a fairly known fact, the general practice is to use the same size screw for locking. However, this arrangement has been known to loosen from vibration because both screws will move at the same rate.

The illustrated idea shows how we solved the problem. Two setscrews of different diameters and thread pitch are used. The small setscrew has standard NC threads and the large, or locking screw, NF threads. In this case, a brass plug is used under the first screw to prevent damage to the shaft threads.

Screw-size combinations should be chosen so the smaller screw can enter its hole without having to be forced through the outer threads. We use a 7/16-in. NF screw to lock a ⅜-in. NC, or a 9/16-in. NF on top of a ½-in. NC.

*Edwin Achinelli, Buenos Aires, Argentina*




## Dowel Puller Gets The Tough Ones

This puller was designed to extract dowels from blind holes without marring the surface of the part in which they are seated. It may also serve as the only means of pulling a dowel where leverage can't be applied.

The outer shell of the puller is cut from a length of pipe and faced at both ends. Over one end a heavy washer is welded to support a fine-thread capscrew.

A piece of bar stock with a sliding fit in the pipe is drilled and tapped in one end for the draw screw. The other end is drilled to accept a particular diameter dowel. The dowel is gripped by a capscrew entered perpendicularly through a slot in the pipe and into the dowel socket. This arrangement lets the screw serve as a key in a key way.

In most cases it will be necessary to grind a small flat on the dowel for a better grip with the clamping screw. This flat will not make the dowel less useful.

*W F Melenric, Old Forge, Penna*

## Constants for Rack Forms With Full Radius Tips

Highly stressed gears, splines, and thread forms are made with large-radius root fillets. Gear generating grinding wheels, hobs, thread-milling cutters must therefore have corresponding large tip radii.

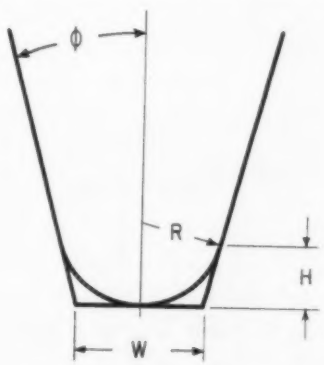
Because it is often more desirable to produce a full radius on the generating tool tip, rather than two smaller radii, a quick method of calculating the full radius is a convenience.

The table lists constants for pressure angles Ø generally employed. To find the full radius R, and point of tangency H, based on land width W, the following formulas are used:

$$R = \frac{W}{2}\cot\left(45° - \frac{\emptyset}{2}\right)$$

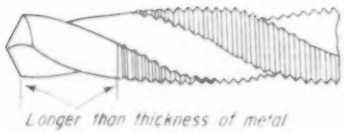
$$H = R\,(1 - \sin \emptyset)$$

*Carl Johnson, West Palm Beach, Fla*




| Pressure angle Ø | Full radius R | Point of tangency H |
|---|---|---|
| 14 ½° | 0.646 W | 0.484 W |
| 17 ½° | 0.682 W | 0.477 W |
| 20° | 0.714 W | 0.470 W |
| 22 ½° | 0.748 W | 0.462 W |
| 25° | 0.785 W | 0.453 W |
| 27 ½° | 0.824 W | 0.443 W |
| 30° | 0.866 W | 0.433 W |

# Practical Ideas...




## Spiral-Flute Tap Drills Too

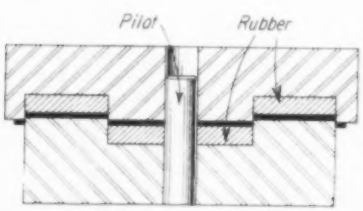
Do you want to eliminate one of the operations in a drilling and tapping sequence? If your work thickness isn't too heavy, a converted spiral-flute tap may do both jobs for you in one simple operation.

We use this drill-tap combination in a drillpress having a built-in tapping attachment. Only one spindle is required, and drill fixtures need only one bushing, the tap size.

The resemblance of the spiral-flute tap to the standard twist drill gave us the idea to try this method. The diameter at the end of the tap was ground down to tap-drill size and a little longer than the work thickness, then backed-off to produce proper drill flutes. After fashioning a drill point, the first few of the remaining threads were backed-off to give them a good bite.

Thousands of holes have been drilled and tapped with these combinations in our shop in materials like brass, steel, cast iron, and even stainless steel. Tap sizes have ranged from 6-32 to ½ in.-13.

*Joseph Polinak, Kimble Glass, Vineland, NJ*




## Submersion is Answer to Difficult Blanking Job

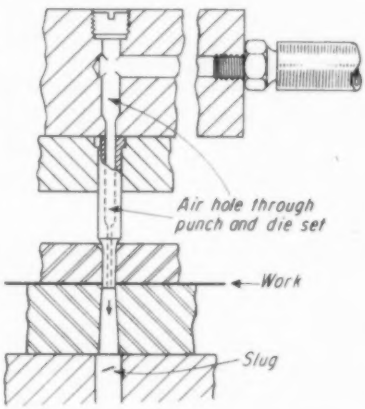
We recently had to blank out a small number of washer-shaped parts for brush-holder brackets used in electric motors. The material for these parts was 1/16-in. thick Textolite No. 2053, a material that has many of the characteristics of micarta.

To keep the tool cost down we made the simple rubber die shown. The first few shots showed that modification was necessary because cracks appeared around the edges of the parts.

After some experimenting we came up with a simple solution. Upon loading the die with a blank (which was sawed out square and center drilled to fit the pilot) we submerged the die in water. The result was clean-cut solid parts without cracks.

We can't give any scientific reason why this treatment works better. Perhaps the water dampens the blanking action.

*Edward A Bott, & Ray C Fricke, Fort Wayne, Ind*




## Air Prevents Slug Interference

A compressed-air blast, triggered to blow slugs away the moment the punch pierced the stock, solved a serious die problem recently. Working with stock only 0.002 in. thick, the clearance between the punches and the die holes was naturally almost nil. The suction created caused the slugs to be drawn back into the pierced hole from which they would eventually be shaken loose causing damage to the part.

Though the punches used ranged in diameters from 0.078 in. to 0.236 in., we were able to drill axial holes through them so air could be used to flush the slugs out. Air connections were made by drilling two holes through the die set at right angles to each other as shown. The vertical hole was plugged and the horizontal hole received a standard hose fitting.

An air valve was mounted in such a way that it would allow a short blast of air at the end of the down stroke. Each slug was thus blown clear, removing any chance of it being sucked back.

*Nahuel Tenorio, Buenos Aires, Argentina*

**HERB REICHERT**
**Burlington, Wash**

**won $25 in addition to regular payment for his idea:**

**STEEL BALL LOCATES WORK**

**in the June 16, 1958 issue**

An extra $25 will be paid for the best Practical Idea in each issue of *American Machinist*. Selection of the winner is made by a group of our readers.

Our annual Production Planbook will reprint all winning ideas as a review. One will be chosen out of this issue as a winner of winners, and will receive a

**GRAND PRIZE OF $100.**

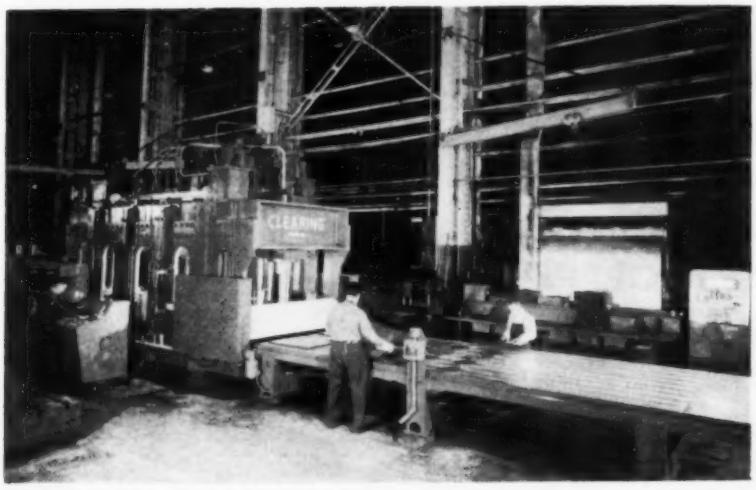
**JUDGES**—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each co-winner. Decision of the readers will be final in each case.

**REQUIREMENTS**—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer, or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

**WHO MAY ENTER** — Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

**HOW TO ENTER** — Send all entries to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N. Y.

# New Shop Equipment
# Materials and Parts



## Clearing Hydraulic Bonding Press Bonds Airframe Structures

This 1400-ton hydraulic press bonds together thin-gage metal parts which have been pre-blanked into the desired shape and size. The press will be used to produce aircraft structural members at Convair, San Diego.

A number of lamination assemblies are set up on the aluminum tooling plate outside the press. When the assemblies are loaded, the tool plate is powered into the press over a series of rollers. When the plate is in position, the rollers are lowered, setting the tool plate onto a hot plate which is built into the press bed.

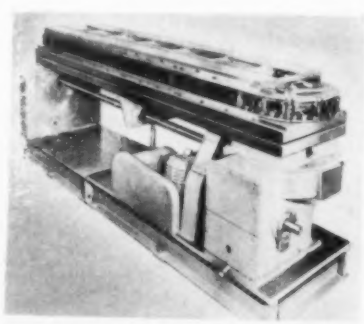
The press slide, equipped with a similar hot plate, moves down onto the assemblies and dwells for a predetermined time, then retracts automatically. The tool plate and the now bonded assemblies are then removed and a similar tool plate, which has been loaded on the opposite side of the press moves into position for a new cycle.

The machine, including the tool plates, is 58 ft long. The press is 18 ft long by 7 ft wide. The slide and bed are solid forgings; this was necessary to assure the accuracy of bed and slide parallelism needed for firm bonding.

Features of the press include a hot plate, cold plate and an insulating board on the slide and bed. Hot plates are steam heated to a maximum of 400 F. The water-cooled plate prevents heat transfer to the slide and bed, so that the heat of the hot plate cannot affect the accuracy of these parts.

*Clearing Machine Corp, Div of U S Industries, Inc, 6499 W 65th St, Chicago 38, Ill*

MORE DATA? Circle 51, inside back cover



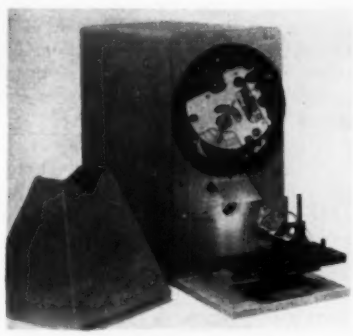
## Indexing Chassis Can be Fitted With up to 51 Work Carriers

Model ST-A18 conveyor-type, cam-operated, indexing chassis is available with 27, 35, 43 or 51 work carriers. Carriers are integral with the conveyor chain links which position the work accurately to each station Camshafts are provided for tool actuation.

Indexing time takes place during 120° rotation of the camshaft; the remaining 240° is used for dwell or work time. Chassis is delivered ready for applying the tools or assembly devices to meet individual requirements.

*Standard Tool & Mfg Co, 237 Laurel Ave, Kearny, NJ*

MORE DATA? Circle 52, inside back cover



## Low-Power Comparators Can Operate in Ordinary Room Light

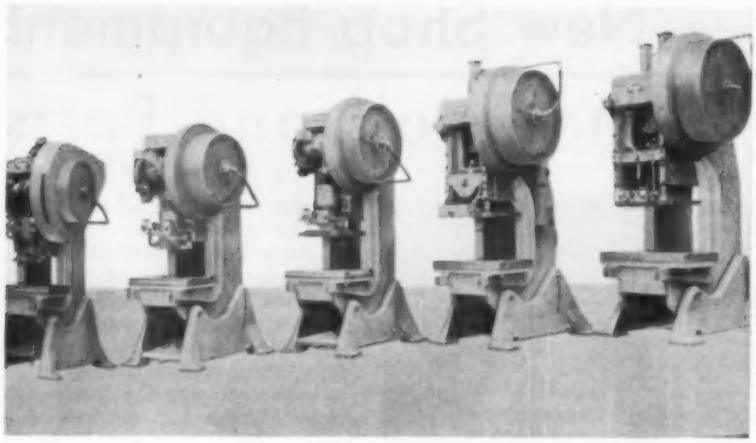
Designed specifically for low magnification work in the 3X to 20X range, this series of production projectors feature large area screens, long working distances, and wide field coverage. Capacity is large, making possible the inspection of sizable parts and assemblies, with up to 3-in. field coverage on the subject at one time.

The projectors may be used under ordinary room lighting conditions without curtains or enclosures.

A variety of charts are available; special charts can be made by the user. Illustration shows a 3X image completely filling a 10-in.-dia screen. Screen hood accessory, shown at lower left, may be attached when working with parts of poor reflectivity or when operator needs to make fine adjustments or close inspection without distraction.

*Stocker & Yale, Inc, Marblehead, Mass*

MORE DATA? Circle 53, inside back cover



## Danly Introduces Line of OBI Presses With Air-Friction Clutches

This complete line of open back inclinable presses features the Danly low-inertia air-friction clutch. This clutch design results in less wear because of the low number of parts, and low weight, to be picked up on clutch engagement. The brake is also air operated and spring set.

Press frames are welded steel construction and are designed to minimize deflection and vibration. Presses range in size from 25 to 200 tons.

*Danly Machine Specialties, Inc, 2100 S Laramie Ave, Chicago 50, Ill*

MORE DATA? Circle 54, inside back cover

entire stroke, which varies from 12 in. for the smallest brake (200 tons) to 18 in. for the larger machines. Ram may be started, stopped and reversed at any point in the stroke. Stroke is adjustable.

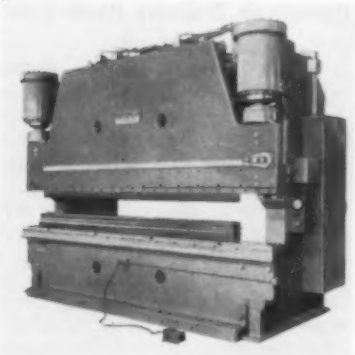
Two speeds are standard, except in the smaller machines. High speed is approximately double the low speed. A third speed, approximately three times as fast as the low speed, is also available as an optional feature.

To speed production, the ram can be made to approach the work and return from it at high speed, but go through the pressing portion of the stroke at slow speed. Tonnage may be adjusted to suit the job.

Unit illustrated is a 500-ton model, with 14-in. stroke, 12 ft between housings, 15-ft over-all length of bed and ram, 16-in.-deep throat.

*Cleveland Crane & Engineering Co, Wickliffe, Ohio*

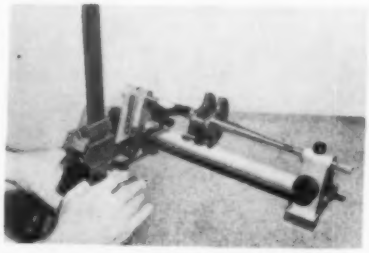
MORE DATA? Circle 55, inside back cover



### Hydraulic Press Brakes Available In Capacities up to 2000 Tons

Steelweld hydraulic press brakes are available in various capacities up to 2000 tons for bending mild steel, from 10 gage to 2 in. and in lengths up to 30 ft.

Because of the hydraulic design, the press brakes cannot be overloaded. Power is constant during



### Miniature Bench Center Speeds Small Parts Inspection

Designated No. 9205M, this miniature bench center features a two-way design that allows checking small work on the centers either horizontally or vertically. It uses a self-aligning shaft which makes it possible for the workpiece to be set in place quickly and accurately by loosening a single locking knob and sliding the tailstock along the aligning shaft. When the tailstock locking knob is tightened, the centers line up automatically.

Tool is completely portable and can be set up quickly on a surface plate for handling any work up to eight inches long and three inches in diameter.

*Taft-Peirce Mfg Co, Woonsocket, RI*

MORE DATA? Circle 56, inside back cover

### Dry Abrasive Cutting Machine Cuts Ferrous and Nonferrous Metals

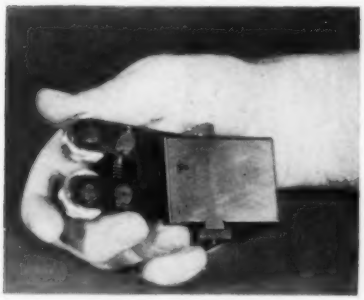
The Sever-All, Model 1-A, a small but heavy-duty, high speed dry abrasive cutting machine, cuts almost any ferrous or nonferrous metal. Machine can cut up to 2x2-in. solids, 3-in. standard pipe, 3x4-in. angle iron and 4-in. channel. Cuts are made at the rate of 3 to 6 seconds per sq in. of metal.

Oscillating action of the abrasive cutting wheel reduces the arc of contact between the wheel and the work, providing faster cutting action, cleaner cuts, and increased wheel life. For small workpieces, the machine can be operated much like a standard chop-stroke unit. For cutting larger areas, provision is made for manual oscillation of the wheel.

The 12-in.-dia abrasive wheel is powered by a 3-hp motor. Available as extra equipment is an adapter to provide for the cutting of any angle from 45 to 135°. Machine is priced under $500.

*American Chain & Cable Co, Inc, Allison-Campbell Div, 929 Connecticut Ave, Bridgeport 2, Conn*

MORE DATA? Circle 57, inside back cover



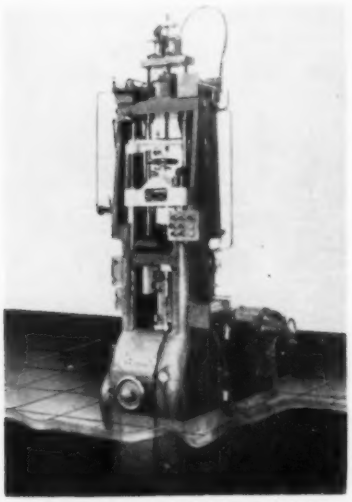
## Thread Rolling Attachment Rolls Threads up to ¼ in. OD

No. 250 Precision-Rol thread rolling attachment for rolling threads up to ¼ in. OD can be used on the 00 Brown & Sharpe and the 9/16-in. Acme-Gridley without machine modification. It is designed for rolling threads from 0-80 to ¼-20 with maximum thread width of ½ in.

Unit makes possible rollover threading of small parts instead of single-side "bump" rolling that may distort the part because of excessive side pressure. Synchronous rotation of rolls is obtained through a gear train. Rolls are easily changed and adjusted for size. Price is $265, less rolls but including adapter.

*Sheffield Corp, Dayton 1, Ohio*

MORE DATA? Circle 58, inside back cover



## Baldwin 75-ton Compacting Press Eliminates Powder Loss

Model 75-A is a 75-ton compacting press designed for compacting such materials as powdered metals, abrasives, carbides, cermets, ferrites, nuclear and other solid fuels for rockets and missiles.

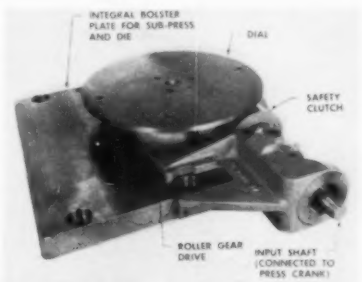
The press is a completely redesigned and modernized version of the former Model 20-A. It affords even higher production rates, eliminates production problems and expense arising from powder loss, and is reported to provide better performance and ease of operation. Design changes include a new upper housing design that permits the feeder to be connected directly to the die holder; a pair of spring-loaded powder cutoffs on the shuttle feeder; and a relocated die float upstop that cannot become contaminated with powder.

Tools for the Model 20-A press are interchangeable with those of the 75-A and, with adapters, tools from other presses also can be used for service and maintenance.

Accessories available include an arrangement for holding the top punch against the part during ejection to prevent laminations or shear cracks.

*Baldwin-Lima-Hamilton Corp, Hamilton Div, Hamilton, Ohio*

MORE DATA? Circle 59, inside back cover




## Dial Feed With Integral Bolster Speeds Press Changeover

Designed for OBI presses up to 60 tons, the Bolster-Matic dial feed with integral bolster facilitates rapid change of setups. Dial and dies may be removed as a unit or the entire index table with dies and bolster may be detached for die setup at a workbench.

A roller gear drive provides indexing to an accuracy of 0.001 in. A modified trapezoid acceleration characteristic is employed to impart smoothness of operation.

The dial feed is synchronized with the press and powered by either a chain and sprockets or driveshaft connected to the main crankshaft. Standard feeds are provided with 6 to 16 stations, from 120° to 270° feed times and rated for speeds up to 200 spm.

*Ferguson Machine Corp, 7818 Maplewood Industrial Court, St Louis 17, Mo*

MORE DATA? Circle 60, inside back cover

## High-Temp Electric Furnaces Available in Four Bench Models

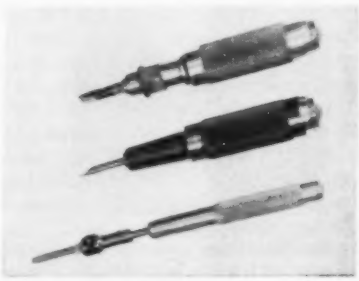
Type 1900 high-temperature electric furnaces all have the same dimensions, case size, and general construction, but differ in power requirements (115 or 230 volts) and maximum operating temperatures (2000 or 2300 F).

The chamber is long in relation to its height and width. There is no waste space to heat. These furnaces can be used for heat treating of small parts and batch testing on production runs.

Over-all size is 15½ in. wide, 18 in. high and 24 in. deep. Chamber size is 4 7/16 in. wide, 4 3/16 in. high and 13¼ in. deep. The 2000-F models, either 115-v or 230-v, are priced at $195; the higher temperature models at $215. These prices do not include controls. A control package is available.

*Thermo Electric Mfg Co, 461 Huff St, Dubuque, Iowa*

MORE DATA? Circle 61, inside back cover



## Hand-Operated Drivers Have Adjustable Torque Settings

The most recent additions to the company's line of Safe-Torque drivers, these hand-operated models are preset for a given torque by engaging the internal adjusting screw with a socket head wrench, turning it clockwise to increase torque and counter-clockwise to decrease torque.

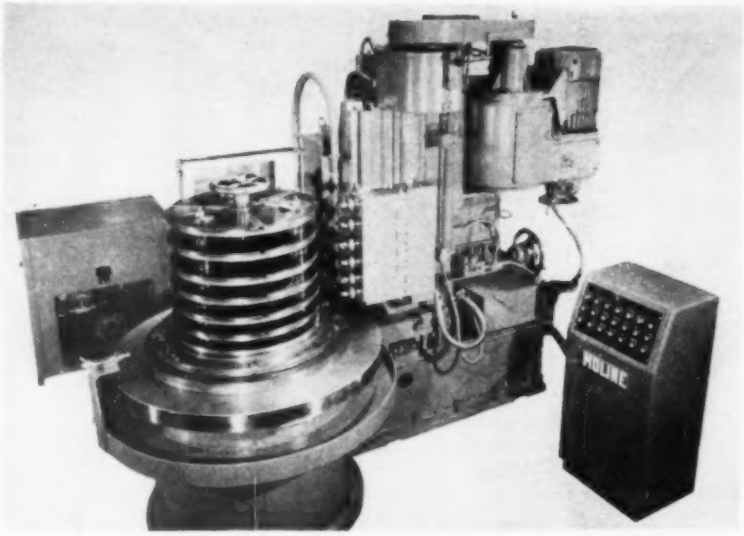
Driver at top has a torque range of 0 to 60 in.-lb and can be used with

a ratchet wrench when fasteners require more tightening torque than can be delivered by hand operation. The middle driver has a torque range of 0 to 25 in.-lb. The bottom driver is designed for instrument assembly and similar work where an extremely accurate torque limiter is required. It has a range of 0 to 96 in.-oz.

Tools operate equally well in either direction. Apex and other standard interchangeable bits, shanks, and sockets for Phillips head, slotted head, clutch head, socket head, and hex head screws can be used.

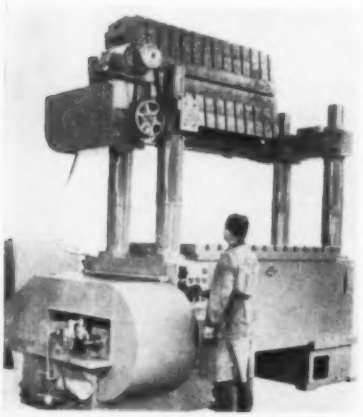
*Scully-Jones and Co, 1901 S Rockwell St, Chicago 8, Ill*

MORE DATA? Circle 62, inside back cover




JET ENGINE COMPRESSOR HOUSINGS are machined on this special, Model M43 6-spindle milling machine. Six annular grooves and the tops of six ribs around the outside surface of the housings are milled. The housing is set down over the manual clamping fixture which supports and clamps the housing from the inside at six levels. Machine cycles automatically for both operations. Parts from 24 to 52 in. dia can be handled—*Moline Tool Co, Moline, Ill*

MORE DATA? Circle 64, inside back cover



## Alpha Die Tryout Press Provides Full Accessibility to Die

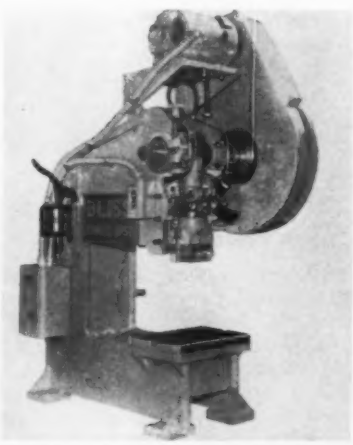
Latest addition to the company's line of mechanical die tryout presses, this 300-ton model has a slide that rotates up to 270° from its normal position, permitting full accessibility to the die with full safety. Less than a minute is required to return the slide and upper half of the die to the running position. The die can be tried and a production run made in the same machine.

Specifications include a slide stroke of 8 in.; a shut height (stroke down, adjustment up) of 36 in.; motorized slide adjustment, 12 in.; bed area, 84 x 48 in. A variable speed drive provides 10 to 30 strokes per min.

Since dies can be loaded into the press by an overhead crane and need not be removed until the desired stamping is produced, tryout time is cut to a minimum.

*Alpha Press & Machine, Inc, 9281 Freeland Ave, Detroit 28, Mich*

MORE DATA? Circle 63, inside back cover



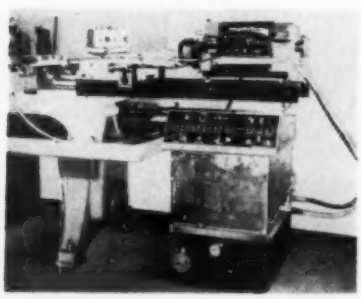
## High Speed Bench Press Handles Large, Wide Sheets

Model 018-DT 7-ton, deep throat, bench press is designed for high speed punching, cutting and forming operations on large, wide sheets. All parts, other than the frame, are interchangeable with Bliss bench and inclinable presses of the same tonnage. Standard stroke is 1¼ in.; maximum stroke available is 2½ in. Throat is 14 in. deep.

Standard features include a fully stress-relieved frame, rolling key clutch, extra long gibs, and a heavy-duty crankshaft. Press weighs 600 lb and occupies bench space of only 27 x 13½ in. With a stand, the press takes a floor space of 28 x 23 in.

*E W Bliss Co, 1375 Raff Rd, NW, Canton, Ohio*

MORE DATA? Circle 65, inside back cover



TURRET LATHE CONTROL, designated Hydrive, can be attached to any self-indexing turret, such as found on turret lathes and hand screw machines. Electronic control of the hydraulic cylinder motion permits stepless feed adjustment from 0 to 240 ipm. Length or depth of cut is controlled within ± 0.001 in.—*Acme Industrial Co, Hydraulic Div, 200-222 N Laflin St, Chicago 7, Ill*

MORE DATA? Circle 66, inside back cover

## How many gages to inspect these parts?

**Just one—if it's a Kodak Contour Projector.**

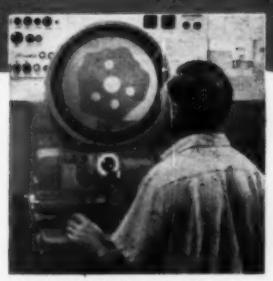
Auburn Plastics, Inc., of Auburn, N. Y., a venerable custom molder, produces a wide variety of component parts for various manufacturers. Formerly this firm needed many mechanical gages to make necessary quality control checks.

A *Kodak Contour Projector* eliminated the expense of buying such gages—amounting in *one instance to a saving* of *$5,000.*

In a fiercely competitive business, Auburn Plastics, Inc., can submit *lower* bids because of savings permitted by *optical gaging.* The company effects additional economies by using its Kodak Contour Projector to inspect *tools* and *dies* as well as manufactured components. In all cases the projector permits gaging of angles, radii, holes and other dimensions—at a glance.

If you have an inspection problem involving myriad small parts, you can do the job easily and inexpensively with a Kodak Contour Projector. Inspection is a matter of comparing the projected image of the part with a chart gage on the screen. You inspect different types of parts simply by changing chart gages. Operators need little training.

For additional information or to arrange for a demonstration of any of the 6 Kodak Contour Projector models, write to:



With this Kodak Contour Projector Auburn Plastics, Inc., accurately gages a great variety of parts down to .001". Operator can easily measure angular dimensions on cams and keys, threaded mold components, center-to-center dimensions on parts and tools.

**Apparatus and Optical Division**

**EASTMAN KODAK COMPANY, Rochester 4, N. Y.**

**the KODAK CONTOUR PROJECTOR**

Kodak

## Hydraulic Molding Press Offers Controlled Approach Speed

This 75-ton down-acting hydraulic molding press offers the advantage of controlled approach speed with stepless tonnage adjustment from five to 75 tons.

Press is available with electrically or steam heated platens, with water cooled platens and with multiple platen arrangements. The hydraulic system is designed to operate economically on the shop air line. Platen working area is 13x13 in., with 12 in. of daylight and 12-in. stroke. Floor area is approximatley 30 x 16 in.

*Allied Engineering & Production Corp, 2421 Blanding Ave, Alameda, Calif*

MORE DATA? Circle 67, inside back cover

## Economy Barrel Finishing Machine Has 13.8-cu-ft Capacity

Supersheen Model EB-3032 barrel finishing machine has a 30-in.-dia x 32-in.-long barrel for high volume finishing of small parts as well as fast action on large castings and forgings. Total barrel capacity of 13.8 cu ft or 1000 lb can be divided into two compartments if desired.

Barrel drive is through a 1½-hp motor and a helical gear speed reducer. A variable speed control allows adjustment of barrel rotation speed from 10 to 30 rpm. Barrels are available with either ¼ or ½-in. neoprene lining, or unlined.

Other features include a roll-away perforated hood, a cam-operated door, and self-aligning bearings. Over-all dimensions: 69 in. long, 41 in. wide and 53 in. high.

*Almco, Queen Products, Inc, Albert Lea, Minn*

MORE DATA? Circle 68, inside back cover

## Radial Arm Drillpress Drills In Any Position at Any Angle

This 24-in. radial arm drillpress makes it possible to drill in any position at any angle. For maximum safety, the tool has a locking key switch and a safety adapter that completely grounds the drillpress while in use.

*Shopmaster, Div of Energy Mfg Co, Monticello, Iowa*

MORE DATA? Circle 69, inside back cover

## Ultrasonic Cleaner Line Includes Bench, Floor, Self-Contained Units

This new line of industrial ultrasonic cleaners includes six models of bench, floor and self-contained styles, all featuring forced air cooling. The units are designed for the full range of industrial cleaning and degreasing requirements, with tank capacities ranging from two to 20 gallons.

All units operate on 110-v, 60-c ac current with the exception of the largest unit which operates on 220/60. Operating at 42,000 cps, models in this series are reported to clean more thoroughly using mild detergents than ordinary cleaning methods using strong detergents.

*Gulton Industries, Inc, Vibro-Ceramics Div, 212 Durham Ave, Metuchen, NJ*

MORE DATA? Circle 70, inside back cover

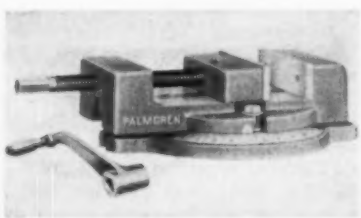
## Pneumatic Sander Does Fine Metal Finishing, Feather-Edge Sanding

The Model 500-V vertical pneumatic sander has been specially designed for fine metal finishing and feather-edge sanding. The long handles provide for quick manipulation and feather-touch accuracy.

Tool can be provided with motors operating at speeds of 2000, 3000 or 4000 rpm. Entire unit weighs only 4 lb 10 oz and may be used with a 5-in. or 7-in. sanding disk.

*Airetool Mfg Co, Springfield, Ohio*

MORE DATA? Circle 71, inside back cover




## Machine Vises Can Be Used With or Without Swivel Bases

Two machine vises have been added to company's line of machine tool accessories. The Low-Boy 325B and 425B vises are designed for milling, drilling, shaping, grinding and other

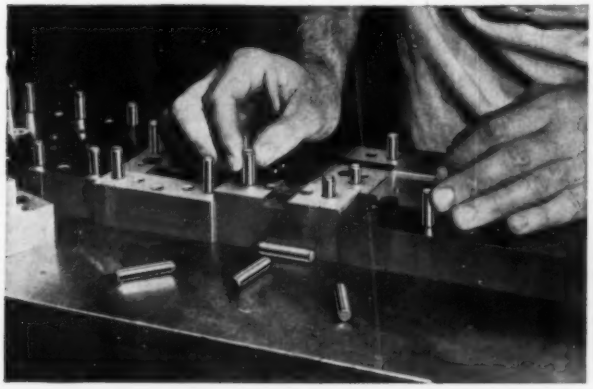
"STOCK ANSWER"
to many a design problem

# ALLEN DOWEL PINS

**ALLEN DOWEL PINS** are being profitably employed in a thousand and one ingenious ways beyond their conventional applications in tool and die work — as economical roller bearings, as axles, precision plugs, hinges and wrist pins to name a few.

If you have an application that will utilize the great strength, accuracy and fine finish of Allen Dowel Pins, you can save substantially on the cost of your product — because you can secure them at favorable prices right from your Allen Distributor's stock.

Check the quick facts at the right and write directly to Allen's Engineering Department for further technical information.



**SPECIFICATIONS**

- Made from Allenoy heat treated steel. Surface hardness 62-64, Rockwell C scale; core hardness 52-54. Case depth .010" to .020" depending on size.
- Single shear strength 160,000 to 180,000 p.s.i.
- Surfaces precision ground to ± .0001" with micro-inch finish of 6 RMS max.
- Sizes: Diameters, ⅛" to 1". Lengths, ⅜" to 6". Very small diameters — 1/16" and 3/32" — on special order.
- Two standard oversizes — .0002 for press fits between mating parts, or .001 for repair work, or holes machined oversize.

ALLEN HEAD

**ALLEN**
MANUFACTURING COMPANY
Hartford 2, Connecticut, U.S.A.



CIRCLE 266 READER SERVICE CARD

operations requiring a rugged holding device.

The 325B with swivel base is 3 in. high, has 3¼-in.-wide jaws, 1⅛-in. jaw depth and a 3-in. jaw opening. The 425B with swivel base is 3½ in. high, has 4¼-in.-wide jaws, 1¼-in. jaw depth and a 4-in. jaw opening.

Vises can be used with or without swivel bases. Vise body as well as base have bolt slots for mounting to machine table. Both models are equipped with Acme thread adjusting screws.

*Chicago Tool & Engineering Co, 8383 S Chicago Ave, Chicago 17, Ill*

MORE DATA? Circle 72, inside back cover

TWO-POINT NUT, the Kaylock H50, is a miniature self-locking nut that yields space savings of up to 40% while weighing less than conventional hex nuts. Wrenching is done on the threaded nut element itself, which is provided with two integral wrenching points. Nut is available in sizes 4-40, 6-32 and 8-32. Bulletin available—*Kaynar Mfg Co, Inc, Box 2001, Terminal Annex, Los Angeles 54, Calif*

MORE DATA? Circle 73, inside back cover

## Accessory Permits Drillhead To be Mounted on Overhead Track

Accessory consists of a carriage and column which may be mounted with a standard 20-in. Delta drillhead and its raising mechanism on a jib crane or similar type track. This setup is useful in drilling panels, sheets, plates or large work (such as the piece shown in the rotary jig shown in the picture) or in any other application where the work is difficult to move or where it is easier to drill a number of holes without moving the work. In such a setup the spindle may be positioned over any point within ten inches of either side of the track anywhere along its length.

The price of the accessory is approximately $128. Price of a complete unit — accessory, drillhead, raising mechanism, but without motor—for mounting on an overhead track is approximately $400 to $450, depending upon the drillhead used.

*Delta Power Tool Div, Rockwell Mfg Co, 490 N Lexington Ave, Pittsburgh 8, Penna*

MORE DATA? Circle 74, inside back cover

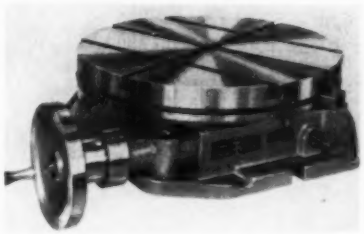
## Honing Machine Has Infinitely Adjustable Spindle Speeds

Model AM honing machine is designed for production runs, toolroom work and salvage operations. It measures 48 in. high, 28 in. wide and 36 in. deep. Spindle speeds are adjustable from 250 to 1400 rpm.

The drive, the 14-gal removable coolant tank and the 1½-hp motor are completely enclosed in the heavy steel base which has a louvered cover to provide ample ventilation. Standard V-belt drive belts are employed and automatic tensioning is provided. All on-off switches are mounted on the front of the machine.

*Superior Hone Corp, 1607 Elreno St, Elkhart, Ind*

MORE DATA? Circle 75, inside back cover



## Rotary Table Line Redesigned For Greater Versatility

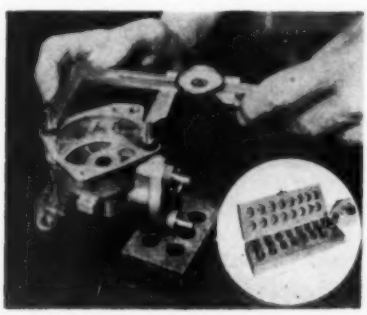
Redesigned to offer additional features and greater accuracy, these tables are available in six diameters ranging from nine to 25 in. and in eight different models.

Tables can be used in such operations as cutting segments of circles and circular slots, milling clutch teeth, locating angularly spaced holes or slots, and cutting irregular contours.

Features include easy-to-read dials, accurately graduated in 1-min intervals; one-piece wormshafts; enclosed, dustproof base; precision ground turntables; and coolant troughs on the larger models. Dividing attachments are available.

*Troyke Mfg Co, Cincinnati 41, Ohio*

MORE DATA? Circle 76, inside back cover

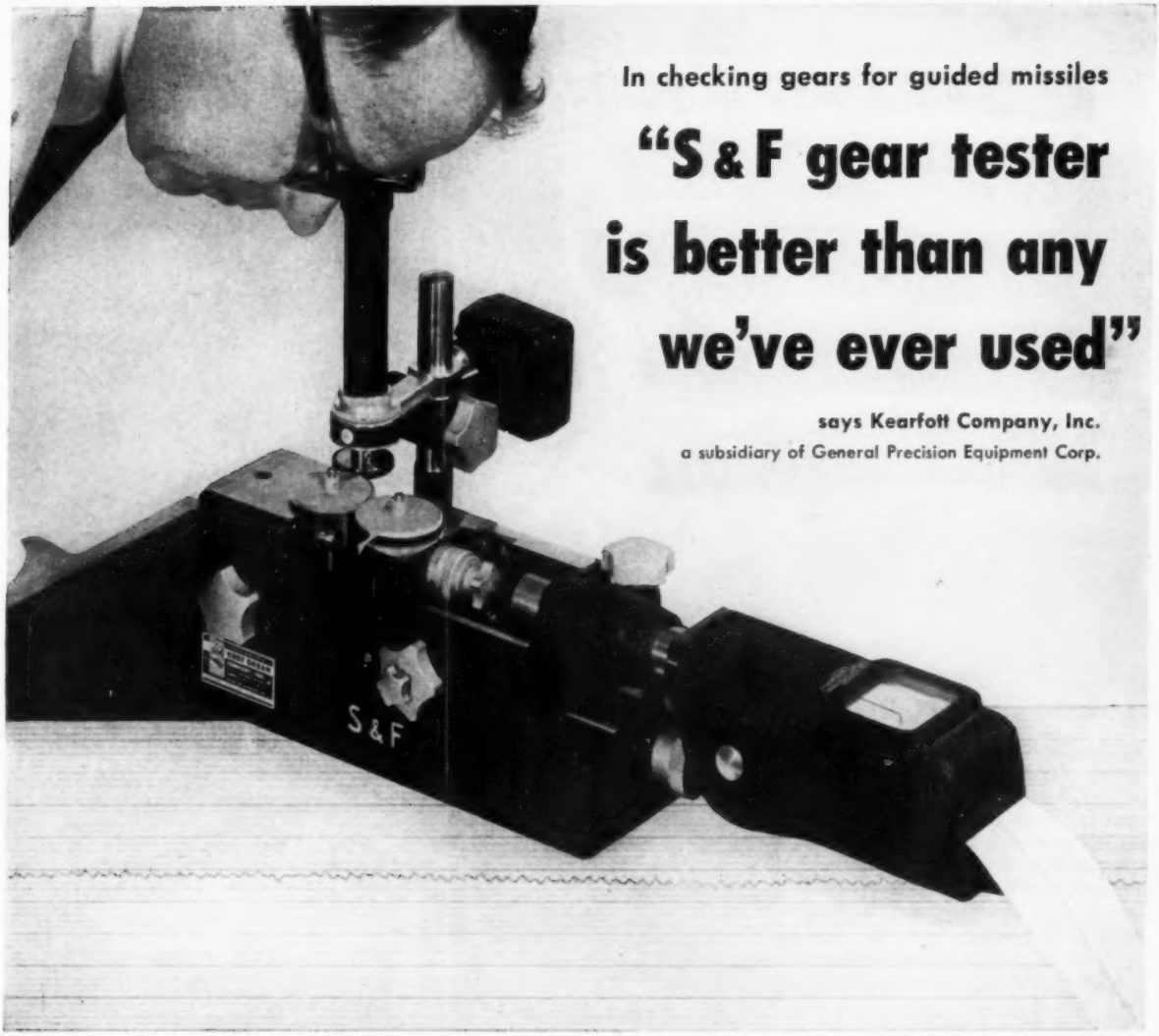


## Plug Gages Check Center Distances Of Thread Holes

Called Jo-Plugs, these gages simplify inspection and setup procedures for checking the dimensional accuracy of threaded hole centers. The gage consists of a threaded plug base and an upper spindle called a Jo-spindle. Jo-spindles act as a constant throughout the entire range of plug sizes and are a uniform 0.200 in. dia.

To check center distances, proper size Jo-Plugs are screwed into the holes, allowing the Jo-spindles to act as reference measuring points.

The checker has only to measure the distance between the Jo-spindles, and add the constant (0.200 in.), to




In checking gears for guided missiles

# "S & F gear tester is better than any we've ever used"

says Kearfott Company, Inc.
a subsidiary of General Precision Equipment Corp.

Graphotest record of gear checking at Kearfott illustrates sensitivity of S & F Testers.

## There's no gear tester as accurate as the S & F...

# guaranteed to repeat within .00001"

To insure the precision control and navigation of guided missiles and aircraft, Kearfott gears *must* be accurate within .00025". Kearfott technicians use seven S & F testers to check these gears and here's what they say about them: "Excellent for accuracy and repeatability—better than any tester used previously. They require minimum maintenance, are economical to buy and use."

That's why there are over 500 S & F testers in some 316 plants that take their gear checking seriously. They've changed over to S & F to make sure that the gears they make—or buy—are as accurate as they're supposed to be.

Ask us to show you why the S & F is revolutionizing gear checking. Or talk to S & F users near you; we'll send you their names.

KO CO., INC. PRECISION MACHINERY

**KURT ORBAN**

**COMPANY, INC.**

36 Exchange Place, Jersey City 2, New Jersey



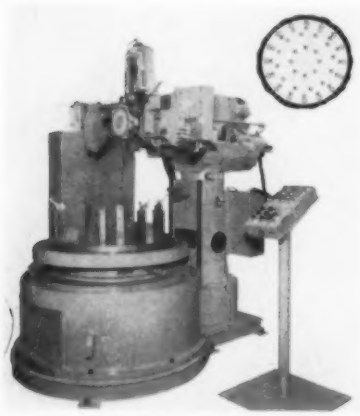
CIRCLE 267 READER SERVICE CARD

obtain the distance between centers, within a tolerance of ±0.00015 in.

Jo-Plugs are made of hardened Graphmo tool steel and are available in boxed sets in thread sizes ranging from No. 4 to 1 in., NF NC or special thread forms.

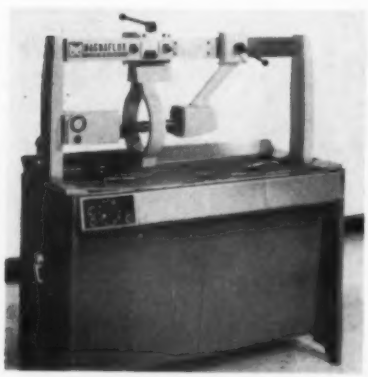
*Spence Industries, 6910 Chase Rd, Dearborn, Mich*

MORE DATA? Circle 77, inside back cover



RADIAL TURRET DRILL is built from standard Burgmaster parts. This automatic hydraulic tool is arranged for center drilling, drilling and tapping bolt circles having 8, 13 and 16 hole patterns. Bolt circles are of different diameters and at different levels on a dome-shaped aluminum part. Drill capacity in mild steel is ¾ in. dia; ⅝ in. dia tapping capacity—*Burg Tool and Mfg Co, 15001 S Figueroa St, Gardena, Calif*

MORE DATA? Circle 78, inside back cover



## Magnaflux Testing Unit Handles Ferrous Parts up to 24 in. Long

This completely re-engineered testing unit, the NQ-242, employs the wet magnetic particle inspection method, either visible or fluorescent, and provides a rapid means for production testing of small ferrous parts up to 24 in. long.

The suspended magnetizing coil and heads permit conveyorization of parts either through or across the unit. Coil, which pivots and slides along the overhead track, may be positioned between the heads for both longitudinal and circular magnetization of parts, moved to the right for separate coil magnetization, or stored at the extreme left when not in use.

Other features include recessed front panel and 38-in. table height for sit-down operation; removable and reversible grills; stepless current control; and stainless steel tanks to accommodate either oil or the new water suspendible magnetic particle baths.

Unit operates from 220/440-v, 50/60-cycle, 3-phase current. The dc magnetizing output is 1750 amps through the heads and 6000 ampere-turns through the coil. An ac version of the same unit is available.

*Magnaflux Corp, 7300 W Lawrence Ave, Chicago 31, Ill*

MORE DATA? Circle 79, inside back cover

## Magnetic Chuck and Speed Control Speed Production Grinding

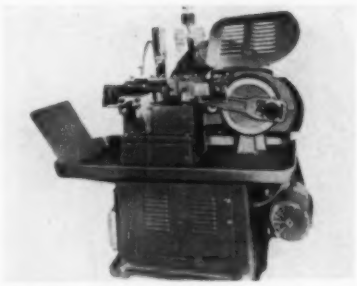
This precision grinding team consisting of the Selectron automatic chuck control and the Power-Grip magnetic chuck provides variable holding power and a demagnetizing cycle that eliminates all residual magnetism.

Consistent repetitive accuracy is obtained because the demag feature permits swift and thorough chuck cleaning.

Chucks and control units are available in a range of sizes for most surface grinding applications in both direct control and remote control models.

*DoAll Co, Des Plaines, Ill*

MORE DATA? Circle 80, inside back cover



## Thread Rolling Machines Produce 60 to 120 Pieces per Minute

This new line of thread rolling machines is designed for heavy duty production but is reported to be priced to meet the needs of small and medium producers. The Shuster thread rollers are the reciprocating die type, and roll threads, knurls, gimlet pointed wood screws, machine screws and other similar products.

Depending upon the machine used, two- or three-inch lengths of thread may be rolled. Four machines are presently available; two are manually fed, and two hopper fed. Production rates range from 60 to 120 pieces per minute.

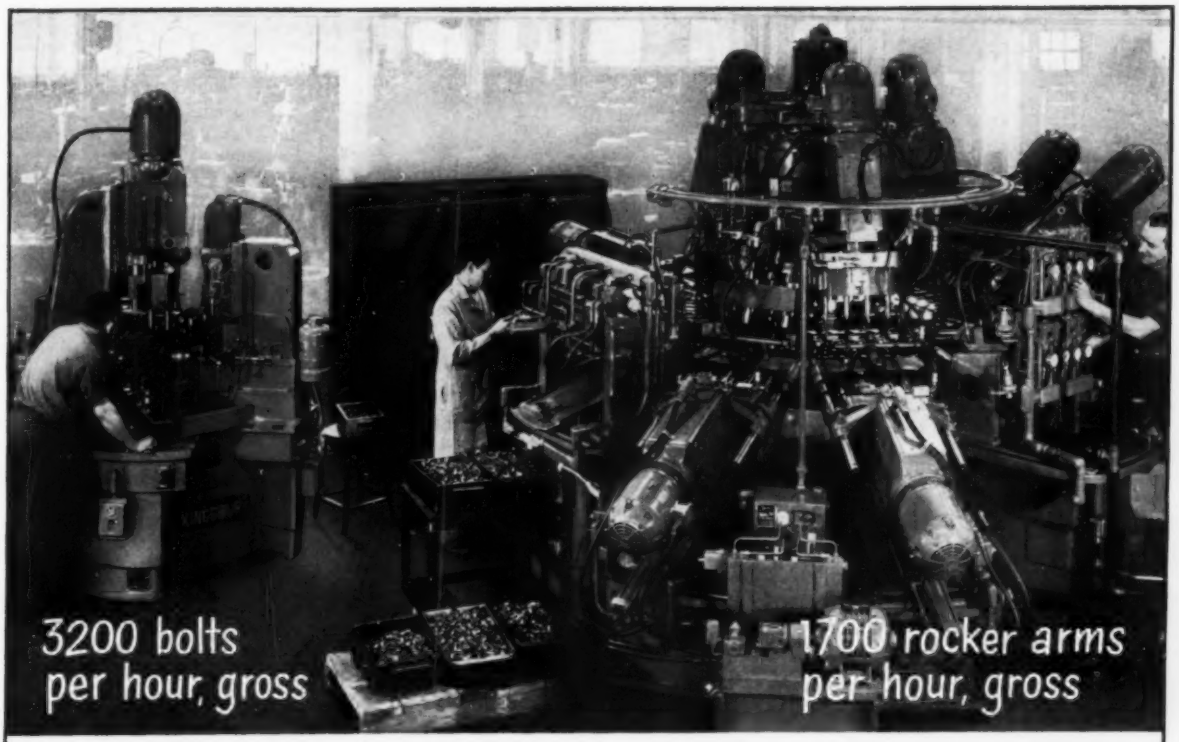
Machines are equipped with 3-hp motors or US Varidrive motors. Maximum thread diameter is 5/16 in.

*Mettler Machine Tool, Inc, New*

MORE DATA? Circle 81, inside back cover

COIL SUPPORT MEMBERS of case hardened steel permit company's stock reels to handle coils as heavy as 300 lb. The supports direct the uncoiling stock in a loop to the press at whatever speed is established by the press feed—*Jaco Devices, Inc, 90 High St, Hingham, Mass*

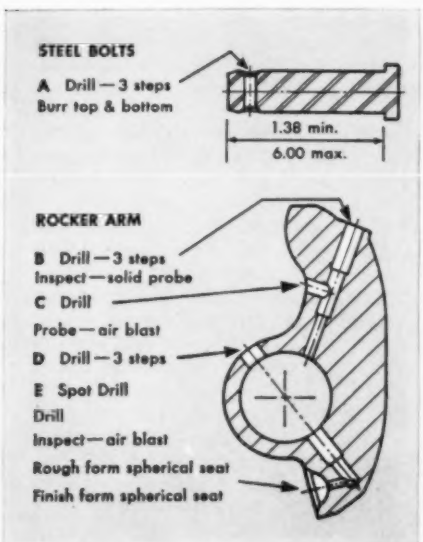
MORE DATA? Circle 82, inside back cover




*On the left* — a ten-spindle Kingsbury. It completes two bolts every 2.2 seconds (including indexing). The big unit has a three-spindle auxiliary head and drills hole A in three steps at three stations. Each small unit has an underneath attachment and burrs one part top and bottom. Parts are ejected onto a chute between these burring units.

*On the right* — a 56-spindle Kingsbury with center column. It completes four rocker arms every 8.5 seconds (including indexing). All units have four-spindle auxiliary heads with oil mist lubrication. Units on the center column operate on hole B. Units on knees around the base work downward on holes C and D and upward on hole E. The units for hole E have hydraulic slides for more efficient changing of tools.

# ...talk about high production!




These two Kingsburys have extremely high production rates because they (1) operate on more than one part at a time, (2) have short time cycles by drilling in steps, and (3) automatically clamp, unclamp and eject onto chutes. The machines are on our assembly floor ready to ship. The customers have approved test samples.

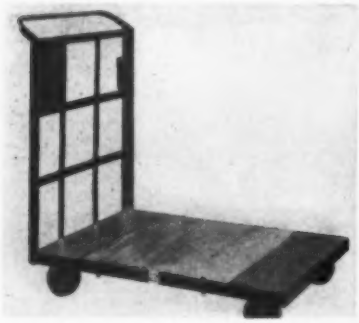
One machine is fairly simple, the other complex. But both will continue to produce good parts month after month because they have good basic design and rugged, accurate construction.

## LOWER PRODUCTION RATES

Most Kingsburys produce at rates of 200 to 600 parts per hour. We design each one to meet the customer's requirements. On most machines each fixture holds only one part. Many have manual clamping.

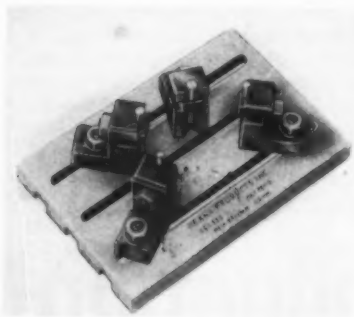
For 38 years we have built machines that our customers don't worry about. May we do the same for you? Kingsbury Machine Tool Corporation, Keene, New Hampshire.

KINGSBURY



MANUAL AND DRAGLINE CARTS, EC line, have load capacity of 1600 lbs, deck size of 32 x 48 in., and are supplied with a 10 x 12-in. blackboard and tubular bill holder. Choice of wheel construction is available; tow pin for dragline carts has double cam that can be operated from either side of cart. Data sheet 151—*SI Handling Systems, Division Safety Industries, Inc, PO Box 70, Easton, Penna*

MORE DATA? Circle 83, inside back cover



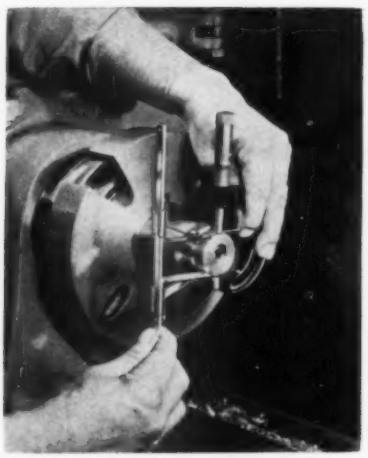
## Adjustable Hole Location Gage Also Checks Part Dimensions

This adjustable gaging tool, known as the Holocator, can be used in a variety of ways in the shop. It can be used to check size and location of holes in a part; to check the relation of a given surface to holes in the part; to check flange holes in relation to the center bore; to check pitch diameter of a gear; etc.

Gage consists of a ground base plate, hardened and ground pin holders, and clamping yokes. Pin holders are attached to the base with T-bolts, and the gaging pins are held in the V's of the pin holders by the clamping yokes. Standard gage has a 4x6-in. base plate, four pin holders and four clamping yokes. Special size bases and additional pin holders and yokes are available.

*Reana Products Inc, PO Box 555, New Britain, Conn*

MORE DATA? Circle 84, inside back cover

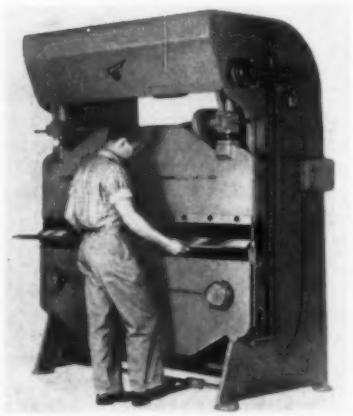


## Thread-Measuring-Wire Holder Speeds Thread Measurements

Called the Third Hand, this device holds the three measuring wires over the thread while measuring external threads. This simple device eliminates juggling and does away with makeshift holders. It consists of a stainless steel bar with two sliding elements which adjust up and down the bar, under spring tension, to accommodate different sized workpieces. Each element has a resilient pad which holds the measuring wires. The device is sold with an instrument case and is priced at $6.50.

*Distributed by Flynn Boring Tool Co, 133 Flowerdale, Ferndale 20, Mich*

MORE DATA? Circle 85, inside back cover



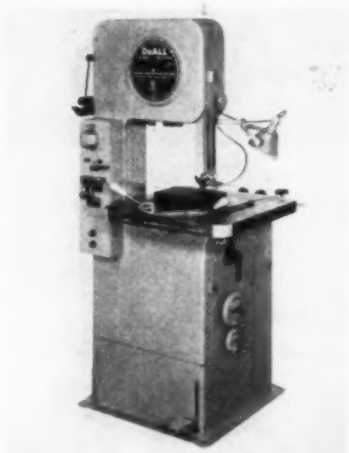
## Press Brake Offers Adjustable Stroke, Two-Speed Operation

Model 16-72 Di-Acro Hydra-Power press brake has a capacity of 25 tons. The stroke adjustment feature enables the operator to pre-set the stroke of the ram—in less than 15 seconds—to the narrowest possible opening for each job. Two speeds are available during each operating cycle. The ram travels at fast speed to a pre-set point just above the work, goes through the work part of the stroke in slow speed (with full pressure) and then resumes fast speed on the return part of the stroke.

Standard equipment on this 6-ft-bed model includes the stroke adjustment and two-speed features, power ram adjustment, ram adjustment indicators, front-operated micrometer back gage, lower die holder and section ram clamps. Cost complete with standard equipment is $3950.

*O'Neil-Irwin Mfg Co, 512 Eighth Ave, Lake City, Minn*

MORE DATA? Circle 86, inside back cover



## Lowcost Contour Band Machines Available in 16- and 30-in. Sizes

Model 16M (illustrated) and Model 30M contour band machines, designed for toolrooms, jobbing shops, sheet metal shops and maintenance shops, are powered by a new Speedmaster variable speed drive that delivers the full output of the 1-hp motor to the cut throughout the entire 50 to 5200-fpm band speed range.

This wide speed range allows the machines to be used to contour saw any machinable material as well as band file, band polish, line grind and friction saw any thin ferrous work.

Deep throat of Model 30M permits handling of large jobs. The heavy construction of these machines assures rigidity.

The built-in band shear and welder permit internal cutting. A full line of attachments is available.

*DoAll Co, Des Plaines, Ill*

MORE DATA? Circle 87, inside back cover

to help you beat today's toughest competition . . .

**BUHR** and **SIDNEY** offer

pace-setting exclusive features like these . . .

in your special automation machinery . . .

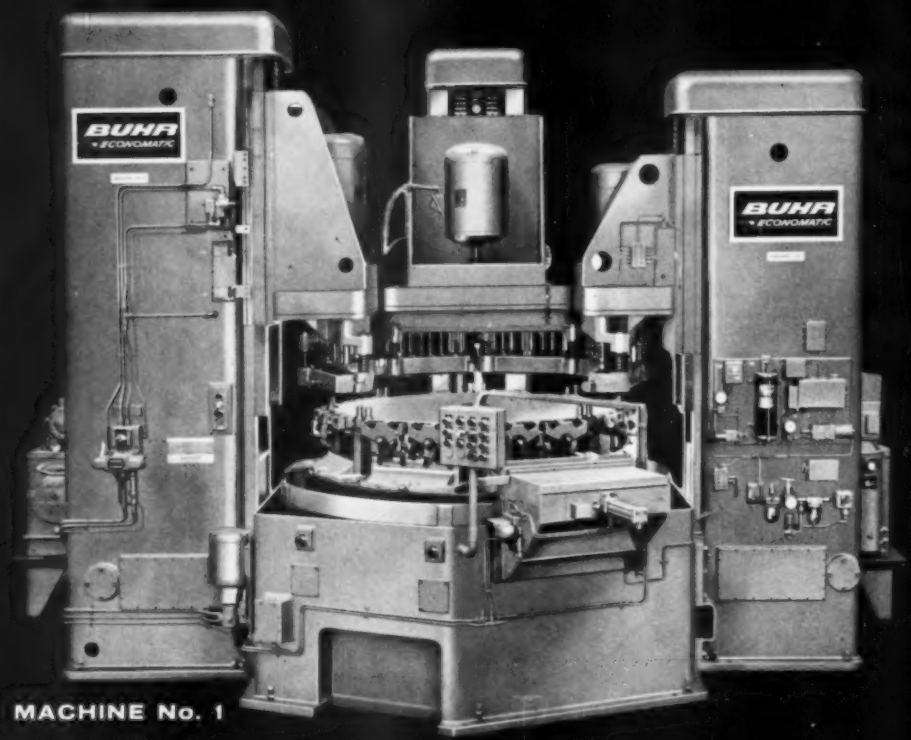
honed gears in multiple-spindle heads

BUHR • ECONOMATIC

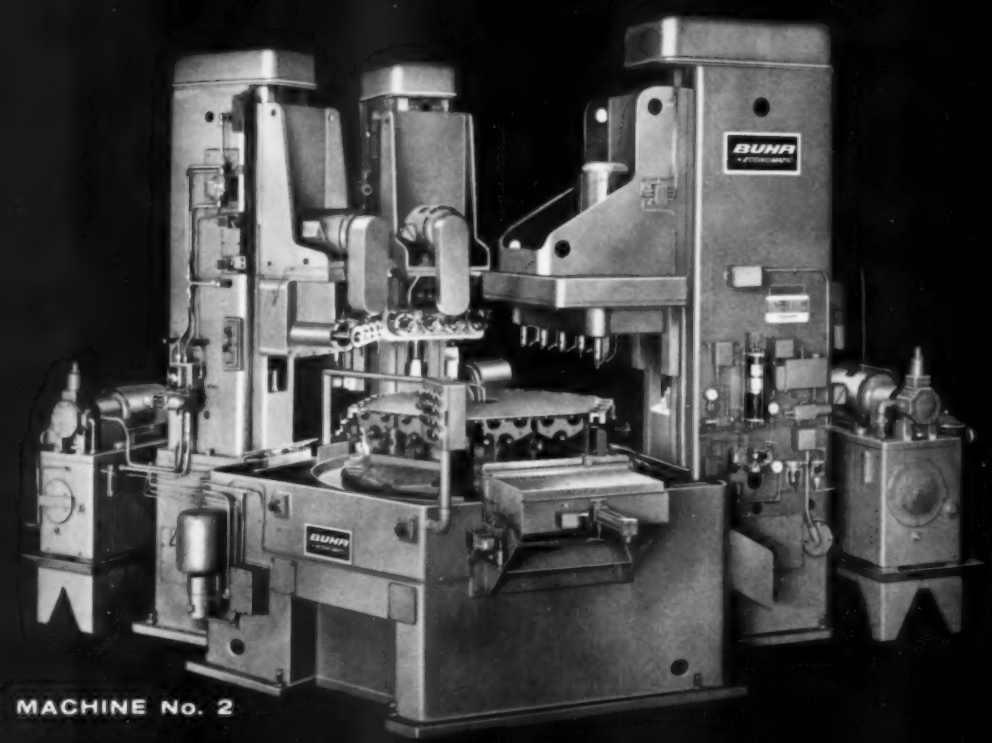
in your heavy-duty metal working lathes . . .

herringbone gears in headstock

SIDNEY




MACHINE No. 1




MACHINE No. 2

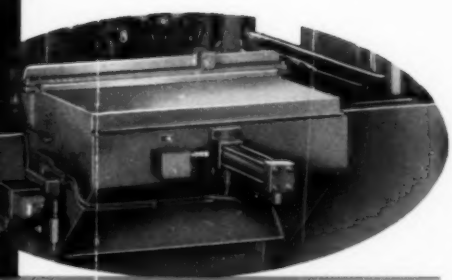
## have out-performed competition by . . .

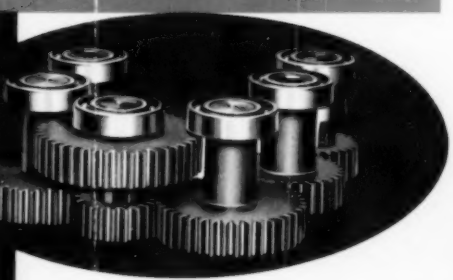
1 *month-in-month-out production record of one finished part each 4¼ seconds . . .*

2 *setting minimum production downtime records . . .*

3 *record-breaking cost efficiency per part!*

**two exclusive features why BUHR ECONOMATICS consistently set such records . . .**





**1 Automatic unloading of work piece—**

Hydraulically-operated work-holding fixtures automatically unclamped . . . unloading device mechanically ejects parts, directing them to storage area.

**2 Honed gears—**

to provide smoother-running heads . . . lengthen gear life . . . reduce frictional loss in horsepower.

**PART—AUTOMOTIVE CONNECTING ROD CAPS**

| ROUGH | MACHINE 1 | MACHINE 2 |
|---|---|---|
| | drill, chamfer, rough-ream and finish-ream bolt holes | mill and chamfer anchor slot and oil-passage groove |

BUHR • ECONOMATIC

*Symbol of Production Dependability*

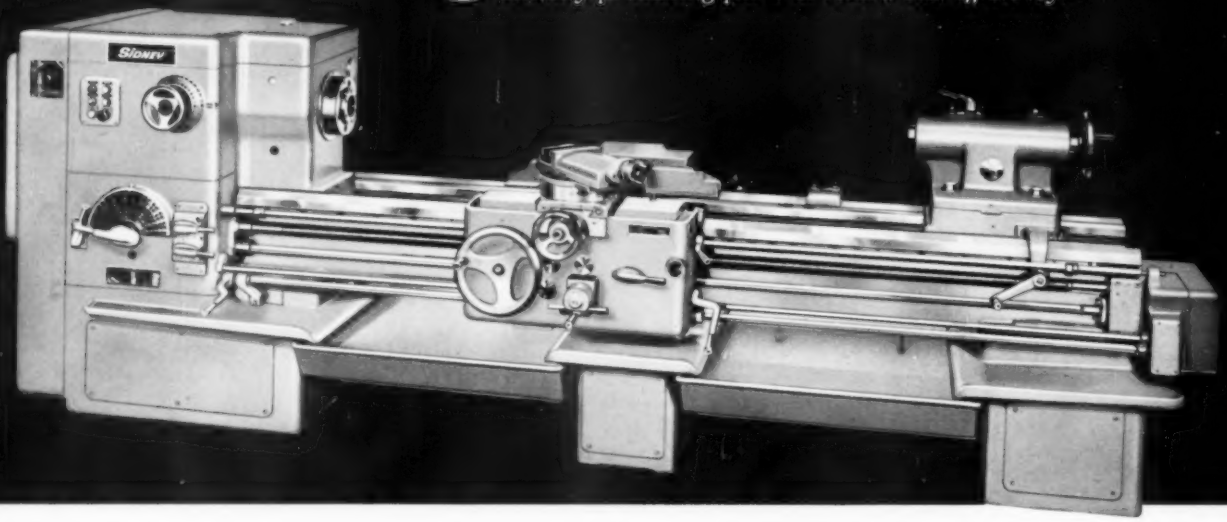
**BUHR** MACHINE TOOL CO.
ANN ARBOR, MICHIGAN
Solidly Engineered • Precision Built • for World's Leading Manufacturers

# SIDNEY LATHES can strengthen your competitive position by...

1 *machining more work per man-hour!...*

2 *continuing to set new records for minimum downtime!...*

3 *actually producing parts at record cost efficiency!*



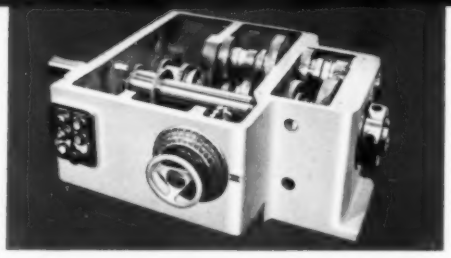

## how Sidney Lathes accomplish this...

**1** *by easier, quicker operations due to such* exclusive features *as Sidney Pre-Selective Spindle-Speeds...*

single direct-reading dial with 32 automatic speed-changes...

**2** *by extra long-lasting basic construction such as Sidney's* exclusive *Herringbone-Geared Headstock...*

complete anti-friction bearing construction with automatic pressure lubrication...



**3** *by manufacturing methods and quality control which . . . on their record . . . have been the finest for dependable, efficient precision workmanship!*

***To meet today's competition, investigate SIDNEY LATHES! Your phone call, wire or letter will bring a personal call and full particulars!***

SIDNEY

**SIDNEY** MACHINE TOOL CO.
SIDNEY, OHIO
Wholly owned subsidiary of Buhr Machine Tool Co.

IT PAYS TO STANDARDIZE ON **STANSCREW**

# Stanscrew service prevents problem for manufacturer of journal bearings

The wise manufacturer eliminates any possibility of fastener breakage *before* it can become a serious and expensive field problem.

As a prime example, a leading manufacturer of sealed cartridge journal bearings was concerned about the cap screws used to hold one essential part—the thrust cap—in place. They knew the lateral movements of a railroad car resulted in thrust on this cap, imposing extremely heavy loads on these fasteners.

A call to their industrial distributor soon had a Stanscrew fastener specialist on the job. He recommended continued use of a torque wrench and worked out the proper setting so that each fastener carried its rated load. Subsequent laboratory tests proved these recommended torque settings insured against fastener breakage.

The manufacturer accepted these recommendations . . . and thus eliminated a potentially serious problem before it could develop. The torque settings and technique developed by the Stanscrew representative have been incorporated in the company's instruction and maintenance manual to insure proper maintenance procedures.

Technical assistance like this is just one of the many reasons more and more manufacturers are standardizing on Stanscrew. Trained specialists, backed by an outstanding engineering staff, can solve your particular fastener problem. In addition to assuring the dependability of your product, often they can save you money . . . for example by substituting a standard fastener for a costly "special".

*Call your Stanscrew distributor today for the answers to your fastener problems. He will see that the Stanscrew Fastener Specialist visits you without delay.*

**STANSCREW** FASTENERS

**CHICAGO** | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
**HMS** | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
**WESTERN** | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

**STANDARD SCREW COMPANY** 2701 Washington Boulevard, Bellwood, Illinois

◄ CIRCLE 272 READER SERVICE CARD

CIRCLE 273 READER SERVICE CARD

# RECEIVING ENTHUSIASTIC ACCEPTANCE

## VICKERS® New ¼" Temperature and Pressure Compensated FLOW CONTROL VALVE

ANOTHER VICKERS FIRST

FOR OPERATING PRESSURES UP TO 2000 psi

For years the Machine Tool Industry has been asking for a combination Temperature and Pressure Compensated Flow Control Valve to minimize feed rate changes. Now for the first time it is available as a production unit at a reasonable price.

### Check THESE EXCLUSIVE FEATURES that mean Optimum Tool Life and Better Work Finish:

- **TEMPERATURE COMPENSATED** — Virtually constant feed rates all day long with same throttle setting because throttle automatically compensates for changes in oil temperature. The compensator mechanism is simple in design and durable.
- **PRESSURE COMPENSATED** — Constant feed rate throughout entire cycle because built-in pressure hydrostat automatically compensates for load changes.
- **SINGLE THROTTLE COMPLETE RANGE ADJUSTMENT** — Greater flexibility because valve is adjustable within entire flow range of 5 to 1000 cubic inches per minute.
- **REVERSE FREE FLOW AS STANDARD FEATURE** — A standard feature which permits reverse free flow (up to 1400 cu. in. per min.) from outlet to inlet port by-passing control elements.
- **TAMPER-PROOF ADJUSTMENT** — Retension of original feed rate is assured because a set screw prevents inadvertent throttle movement and a cover over the set screw can be locked in place.
- **INTERCHANGEABLE** — This new valve replaces 12 previous models and it is interchangeable with all of them, also the drain connection is eliminated on the new valve to simplify piping.
- **GREATER ECONOMY** — No need to stock several valves for wide range of flow rates. Drain connection is eliminated, piping costs are reduced.
- **MAXIMUM RELIABILITY AND ACCURACY** — Design of temperature and pressure control components assures maximum circuit reliability and extreme accuracy of feed through a range of 5 to 1000 cubic inches per minute.

FOR ADDITIONAL INFORMATION SEND FOR I-195040 8143

**VICKERS INCORPORATED**
DIVISION OF SPERRY RAND CORPORATION
Machinery Hydraulics Division
ADMINISTRATIVE and ENGINEERING CENTER
Department 1410 • Detroit 32, Michigan

*Application Engineering Offices:* ATLANTA • CHICAGO • CINCINNATI CLEVELAND • DETROIT • GRAND RAPIDS • HOUSTON • LOS ANGELES AREA (El Segundo) • MINNEAPOLIS • NEW YORK AREA (Springfield, N.J.) PHILADELPHIA AREA (Media) • PITTSBURGH AREA (Mt. Lebanon) PORTLAND, ORE. • ROCHESTER • ROCKFORD • SAN FRANCISCO AREA (Berkeley) • SEATTLE • ST. LOUIS • TULSA • WORCESTER
FACTORIES ALSO IN AUSTRALIA, ENGLAND AND GERMANY
IN CANADA: Vickers-Sperry of Canada, Ltd., Toronto and Montreal

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

**Speed reducers** (worm and wheel), Type DE, are furnished in exact, even-step ratios from 15:1 to 120:1 in three shaft sizes of ⅛, 3/16, and ¼ in. in both 48 and 64 pitches. Available in ball bearing design and oil-less bronze units with over 175 different ratios. Catalog 15.

*PIC Design Corp, 477 Atlantic Ave, East Rockaway, LI, NY*

MORE DATA? Circle 93, inside back cover

**Tapping fluid,** called Rapid Tap, in addition to increasing the efficiency of tapping operations, is reportedly highly effective in reaming, drilling, boring, threading, lathe cutoff, and profile milling. It can be used on all metals and alloys, is non-flammable, non-explosive. Product is available in 4-oz cans with switch spout; also available in pint cans.

*Termite Drills, Inc, 99 N Lotus Ave, Pasadena, Calif*

MORE DATA? Circle 94, inside back cover

**Cleaning agent,** Magnus 61-DRX for removal of light films of oil, shop dirt, and rust deposits from ferrous metal parts, is a granular mixture of strong alkalis containing a special corrosion-solubilizing compound and a wetting agent. Product is normally used in hot water.

*Magnus Chemical Co, South Ave, Garwood, NJ*

MORE DATA? Circle 95, inside back cover

**Skid adapter** for company's Transporter line of operator-led low lift trucks enables the trucks to handle either pallets or skids. This auxiliary platform can be folded back and held upright so that the truck can handle pallets, or the platform can be lowered over the pallet forks to convert the truck into a platform or skid handler.

*Yale & Towne Mfg Co, Automatic Transportation Co Div, 149 West 87 St, Chicago 20, Ill*

MORE DATA? Circle 96, inside back cover

**Welding electrode,** Fleetweld 7MP, is an E-6012 type classed as an all-position, ac or dc, mild steel electrode. The iron powder in the electrode coating is reported to simplify and speed operation. Electrode is available in 1/8, 5/32 and 3/16-in. sizes.

*Lincoln Electric Co, Box 2115, Cleveland 17, Ohio*

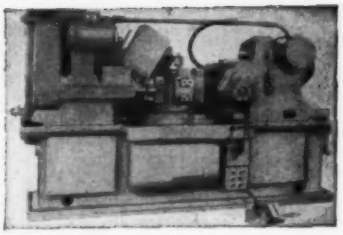
MORE DATA? Circle 97, inside back cover


*Here's what is meant* by

**"1·2·3"**

in the

**GOSS & DE LEEUW AUTOMATIC CHUCKING MACHINE**



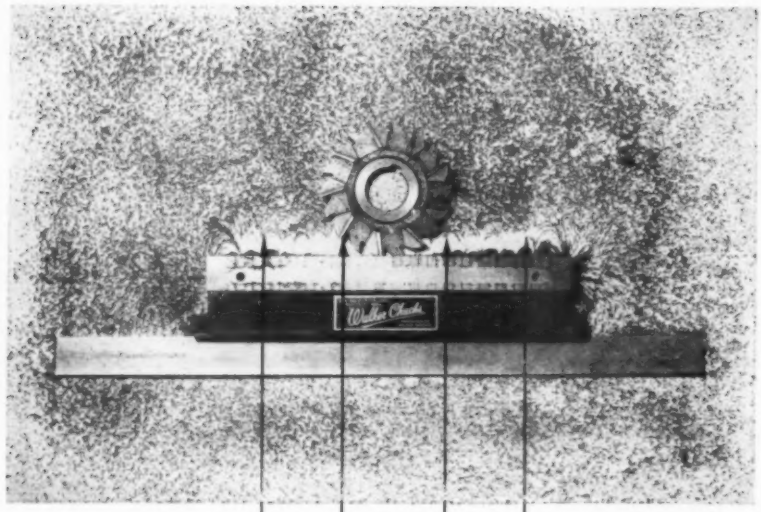
**The outstanding advantage of this machine is ability to handle operations on one, two or three ends of a piece *simultaneously or in sequence, without changing set-up or rehandling.* It is the only standard machine that will do this.**

"1-2-3" means ability to handle work requiring machining operations on one, two or three ends simultaneously or in sequence—a method exclusive with Goss & DeLeeuw and offered on this machine.

*For complete details ask for illustrated bulletin. Send samples of your work for time and cost estimates.*

**GOSS and DE LEEUW**

**MACHINE COMPANY. KENSINGTON, CONN., U.S.A.**



(Unretouched photo)

# Here's POSITIVE PROOF

## ...that WALKER Ceramic Magnet Chucks Eliminate Cutter Clogging and Chip Carryback

Now, for the first time, you can perform milling operations on workpieces held by magnetic chucks, with *minimum* clogging of the cutter, *minimum* carryback of chips into the cut, for trouble-free cutting.

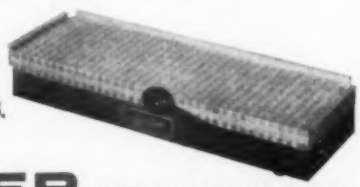
The new Walker Ceramic Magnet Chuck, with magnets polarized *horizontally*—an exclusive construction feature—keeps the cutter constantly *demagnetized* as it progresses. As shown by the white area in the above magnetograph, the magnetic force is where it should be—confined to the top of the chuck for maximum holding. There are no lines of magnetic force extending upward to magnetize the cutter.

In addition to this extremely important feature, Walker permanent chucks offer a great many other advantages.

For example:—

- The ceramic magnets used have many times the coercive force of alloy magnets.
- Uniform holding throughout because of ¼" bar poles.
- All steel top plate. *No* soft insulating material is used.
- Less than half the weight of previous permanent chucks.
- All magnetic fields are neutralized to prevent magnetism of machine table or ways.

Walker permanent chucks with ceramic magnets are available in a complete range of sizes, 6x10", 6x12", 6x18", 8x24", 10x15". Write today for Catalog 58.



**O.S.WALKER COMPANY, INC.**

**WORCESTER 6, MASSACHUSETTS, U.S.A.**

*The Original Designers and Builders of Magnetic Chucks*

## NEW SHOP EQUIPMENT

**Metal cleaner,** Magnusol X-4 for removal of grease and oil from surfaces, is made from a new odorless emulsifier. Product can be sprayed, brushed, or wiped over an oily surface, followed by a pressure water rinse; it can also be used for tank cleaning.

*Magnus Chemical Co, South Ave, Garwood, NJ*

MORE DATA? Circle 88, inside back cover

**Stress-Less line of steel stamps** with round faces has been designed for use in marking parts subjected to vibration, where stresses from sharp-faced markings are common. Stamps are available in 11 sizes from 1/16 to ½ in., in nine and ten-piece figure sets, and 26 and 27-piece letter sets, in either Gothic or Roman type face.

*M E Cunningham Co, 1062 Chateau St, Pittsburgh 33, Penna*

MORE DATA? Circle 89, inside back cover

**Positive rake toolholders** have been added to company's line of carbide insert toolholders. The new toolholders are made in styles for holding triangular or square inserts and in shank sizes for use in conventional tool posts and open-side tool posts. Full range of sizes available.

*Armstrong Bros Tool Co, 5200 W Armstrong Ave, Chicago 46, Ill.*

MORE DATA? Circle 90, inside back cover

**High-strength control tape,** designed for use on tape controlled automatic programming equipment, is designated Peerless, and is made of smooth, 0.005-in.-thick vulcanized fiber. It has a tensile strength of better than 6000 psi, high density, low porosity, excellent abrasion resistance and is easily punched. It falls between paper and polyester film in cost and wearing properties.

*National Vulcanized Fibre Co, 1058 Beech St, Wilmington 99, Del*

MORE DATA? Circle 91, inside back cover

**The A-6 solid lubricant tester** can be used for simulation of most types or combinations of wear, heat, and atmospheric conditions that are usually encountered by such products. Instrument can also be used for the wear or friction testing of many plastics and fibrous materials, as well as oils and greases.

*Hohman Plating & Mfg Co, 814 Vermont Ave, Dayton 4, Ohio*

MORE DATA? Circle 92, inside back cover

people
buy
Scott Wipers
for
many
reasons:

Mr. Donald Donofrio, Machine Shop Head Foreman of Acme Steel, likes Scott Wipers, considers this specially processed Perf-embossed® surface ideal for wiping radial drill presses, lathes, milling machines, grinders and for general maintenance and clean-up wiping. Scott Wipers are soft 2-ply paper, possessing wiping strength and wet strength.

## Scott Wipers keep plant cleaner, eliminate skin complaints at Acme Steel

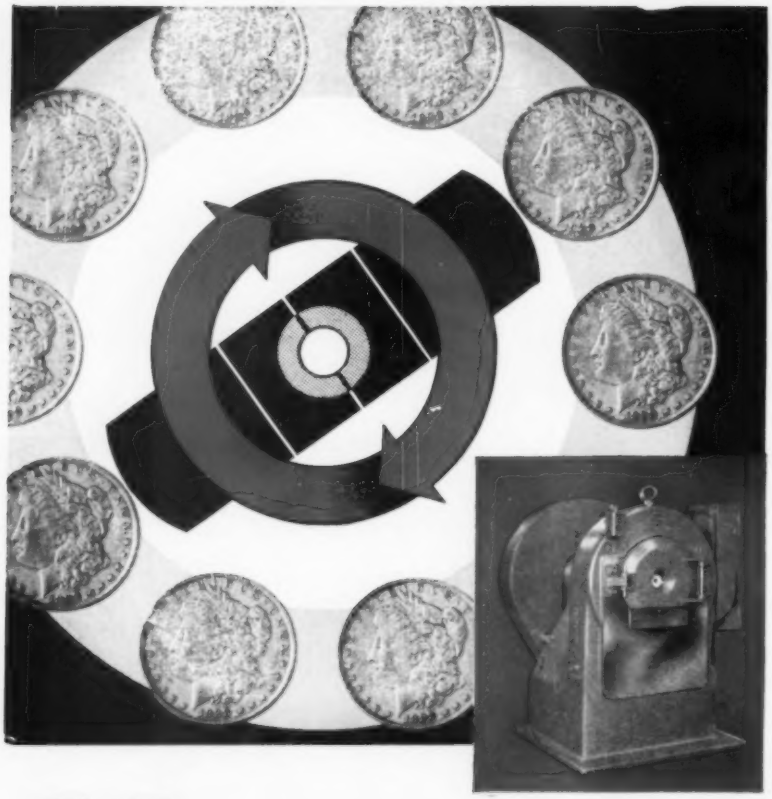
Acme Steel Company, Chicago, one of the largest producers of steel strapping and strapping tools in the nation, uses Scott Wipers in tool crib, machine shop, tool and die department, welding room and millwright shop. Employees had complained about the "harshness" of cloth wipers laundered with heavy soaps and detergents. Scott Wipers stopped these complaints—because *they're* used once, disposed of in handy containers. Scott Wipers have eliminated collecting, counting, bundling and laundry charges, and according to management:
"The plant is definitely kept cleaner now!"

SCOTT PAPER

An interesting film report by John Cameron Swayze on "Paper in Industry" has just been released. Takes just 15 minutes—your Scott distributor can arrange a showing. He's in the Yellow Pages under "Paper Towels." Or write: Scott Paper Company, Dept. AM-88, Chester, Pennsylvania.

See "Father Knows Best" on NBC-TV.

CIRCLE 277 READER SERVICE CARD

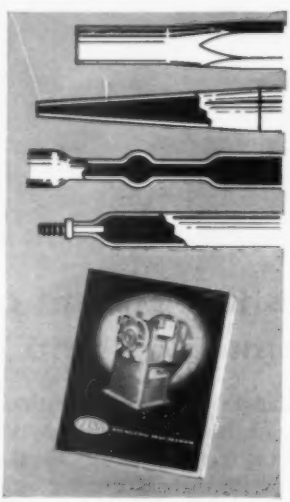


# Moneymaker

Fenn Rotary Swaging makes money by saving money for its users. In fact, with swaging, you save five ways:

- low initial capital investment
- tooling is relatively low in cost
- material savings
- labor savings
- time savings

Fenn Swaging Machines offer many advantages in both design and construction. They perform an almost limitless variety of pointing, tapering, reducing, sizing, and assembly operations. Capacities range on solid bar stock from 5/32" to 3⅜", and tubing to 6". To be sure that you are not machining when you should be swaging, write for Fenn swaging catalog.



FENN Sets the Pace IN ROTARY SWAGING

FENN MANUFACTURING COMPANY • 104 FENN ROAD, NEWINGTON, CONN.


## FIELD REPORT . . .

### National Tool Acquires Auto-Vac Co of Bridgeport

As an initial step in a long-range diversification program, National Tool Co, Cleveland producers of high-precision gear-cutting tools, has taken over Auto-Vac Co, Connecticut manufacturer of automatic machines for vacuum-forming plastics. E Bowman Stratton Jr, A-V president, has become a vice president of National Tool in charge of the Auto-Vac Division.

### Raytheon Ups Hiring

Raytheon Manufacturing Co has leased 400,000 sq ft of space at North Dighton, Mass, has begun hiring some 1000 workers needed there. It'll also put up a new 150,000 sq-ft electronics lab building in Burlington, Mass, to be opened early next year. This facility will add another 1000 workers to company payroll. Company has reached a new employment peak of 31,000, an increase of 3000 since first of the year.

### 1-Million-lb Thrust Engine To Be Built by Rocketdyne

AF contract to begin development of major components for a rocket engine in the one million pounds thrust class has been awarded to Rocketdyne, a division of American Aviation, Inc. Air Force also extended Rocketdyne development of a previously undisclosed engine designed to provide thrust in the intermediate range between current propulsion systems and the million pounder. This work has been underway at the division since mid-1955. Both

*"On this operation, the coolant goes on the operator."*

## "We get ten refrigerator pans a minute...

**from one press and with one attendant!"** From its motorized coil cradle to its mechanized conveyer, this is a truly automated production unit. Coil stock feeds through the press' seven transfer stations... is easily formed and drawn into deep drawn refrigerator pans. Bliss engineers design and build entire systems like these, including the dies.

Can a transfer feed press work for you? Best way to find out is to ask—ask the people who introduced them in the nineties and have pioneered in their improvement since. Or send for new, case history-packed brochure.

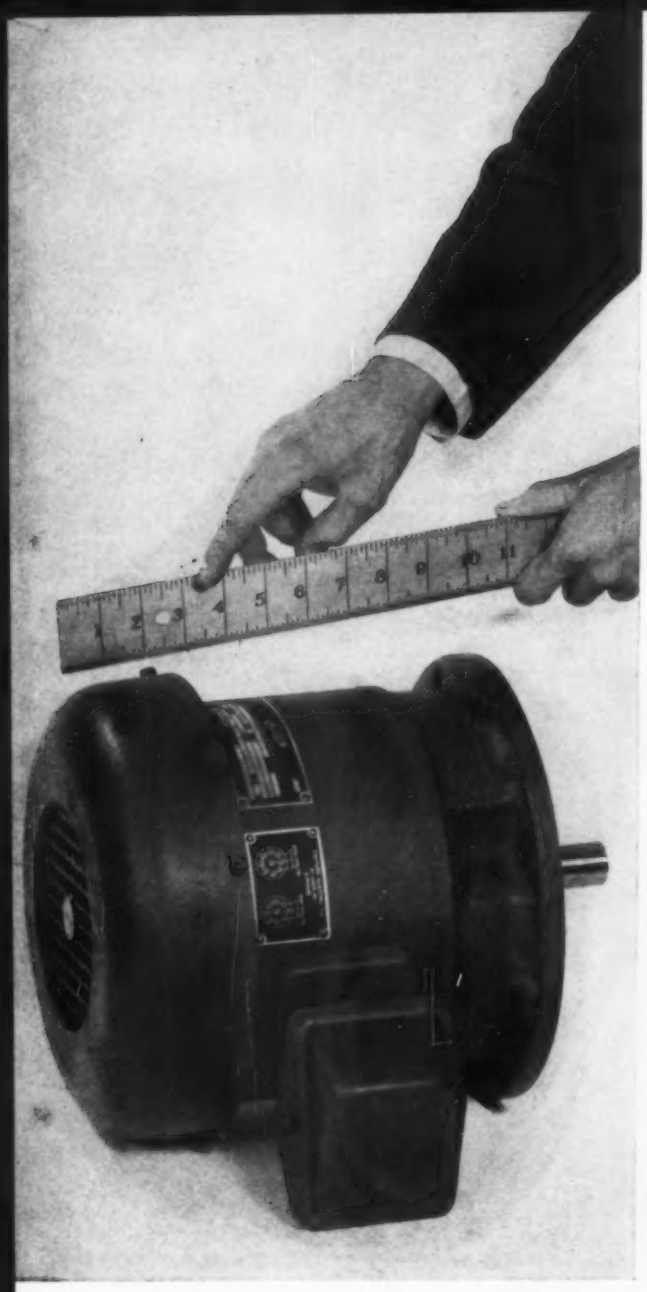
BLISS
SINCE 1857

**E. W. BLISS COMPANY · Canton, Ohio**

*BLISS is more than a name... it's a guarantee*

PRESSES • ROLLING MILLS • ROLLS • DIE SETS • CAN MACHINERY • CONTRACT MFG.

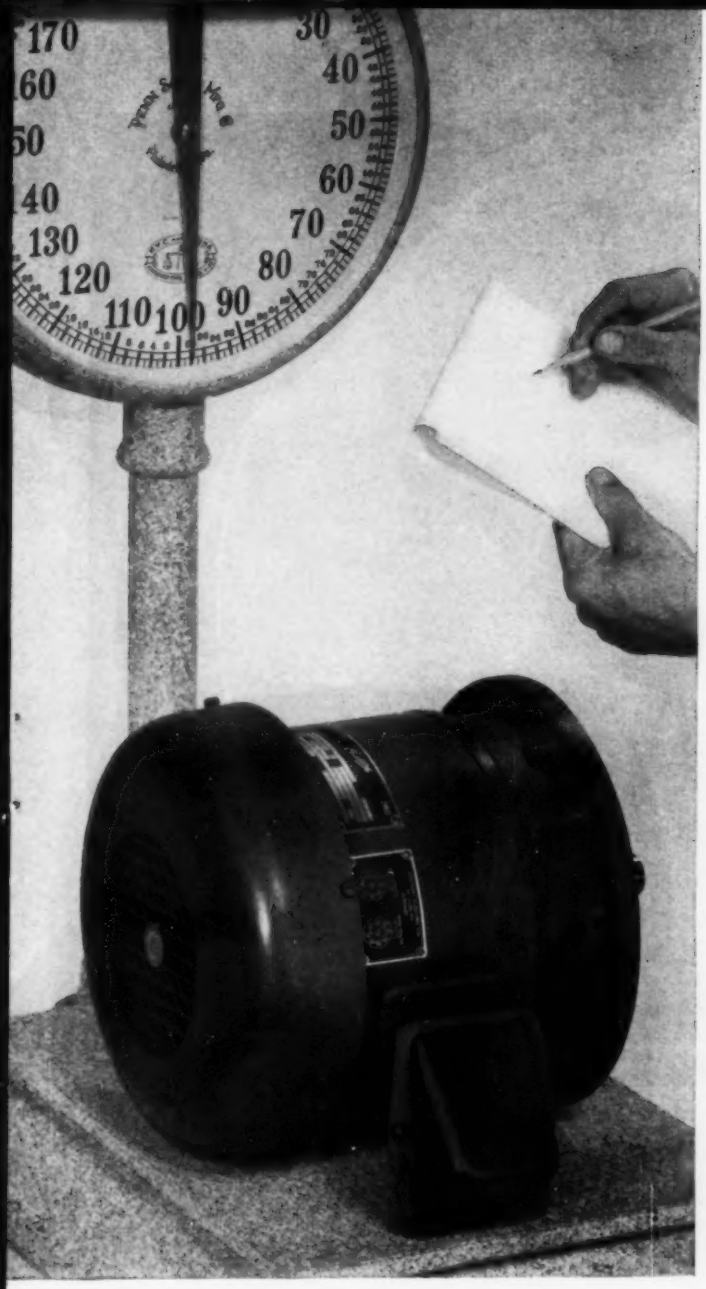
CIRCLE 279 READER SERVICE CARD



# It's smaller. . . easy to mount . .

This is *not* simply a rerated motor. The Century Electric short motor is a standard motor available in ratings up to 15 hp, but . . . it has been redesigned to cut down length as much as four inches. It is designed to save space and weight for application on machine tools, roof ventilators, pumps, centrifuges and many other types of equipment.

**Easy to mount:** You can use this motor in place of any end-mounted motor because it has a standard flange. It can also be mounted horizontally, vertically or at any angle. Its small size means it can be mounted almost anywhere on equipment.



# .lighter . . . *The Century Electric short motor*

**Variety of applications:** The short motor gives dependable performance on applications requiring frequent start-stop operation. You can get it in totally enclosed or open frames. And it has the same quality features and high standards of all of Century Electric's complete line—up to 400 hp.

**More than a motor:** This motor is the result of a continuing search for ways to meet industry's needs. Another reason why you get *more* than a motor from Century Electric.

For more details contact your nearest Century Electric Sales Office or Authorized Distributor.

**CENTURY ELECTRIC COMPANY**

**St. Louis 3, Missouri** *Offices and Stock Points in Principal Cities*

Century

58-14

CIRCLE 281 READER SERVICE CARD

## *white glove inspection keeps industry "on the ball"*

When a ball is made of the finest of metal, and amazingly round, smooth and accurate, it deserves the last word in final inspection—the white glove treatment. That's why *every ball* produced by Hoover is given complete visual examination by trained specialists. Requirements are so exacting that the operation is carried out under scientific lighting in temperature and humidity controlled rooms. Inspectors must wear special lint-free gloves—*white ones.*

Hoover produces a complete range of standard sizes and grades of *Micro-Velvet* Balls in chrome steel, stainless steel, brass, bronze and monel, as well as commercial-type carbon steel balls. Facilities are so extensive that millions of balls are produced in a single month . . . your assurance of quick deliveries and competitive prices in addition to dependably uniform ball quality that is unmatched anywhere.

Make Hoover *your* one source for quality balls.

*Micro-Velvet* is a Hoover Trademark

# hoover quality balls

**HOOVER BALL AND BEARING COMPANY • ANN ARBOR, MICHIGAN**

LOS ANGELES SALES OFFICE AND WAREHOUSE: 2020 SOUTH FIGUEROA, LOS ANGELES 7, CALIFORNIA

Name_____

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Company_____

Address_____

City_____ Zone____ State_____

Hoover Ball and Bearing Company, Ann Arbor, Mich.
Please send the following new literature:

☐ Bulletin 101 describing Hoover *Micro-Velvet* Balls of chrome steel, stainless steel, brass, bronze, monel.

☐ Bulletin 102 describing Hoover Commercial-Type Carbon Steel Balls.

AM-8

### Field Report . . .

engines are liquid propellant systems, similar in principle to Rocketdyne units for the Atlas ICBM, the Thor and Jupiter IRBM's, and the Redstone.

### Techalloy Company . . .

. . . of Rahns, Penna, maintains that its "shirt-sleeve bosses" are workers as well as administrators. Shirt-sleeve or not, the bosses have announced a 5% general wage increase to all employees, established a non-employee-contribution pension plan, and are starting on a quarter-million-dollar expansion program on top of a $650,000 one completed late last year.

### Thiokol Chemical Corp . . .

. . . has been designated by the Air Force to do research and development work on the solid-propellant Minute Man intercontinental missile. Work will be carried out at the company's plants in Utah and Elkton, Md. The weapon is expected to be in operational condition within four to five years.

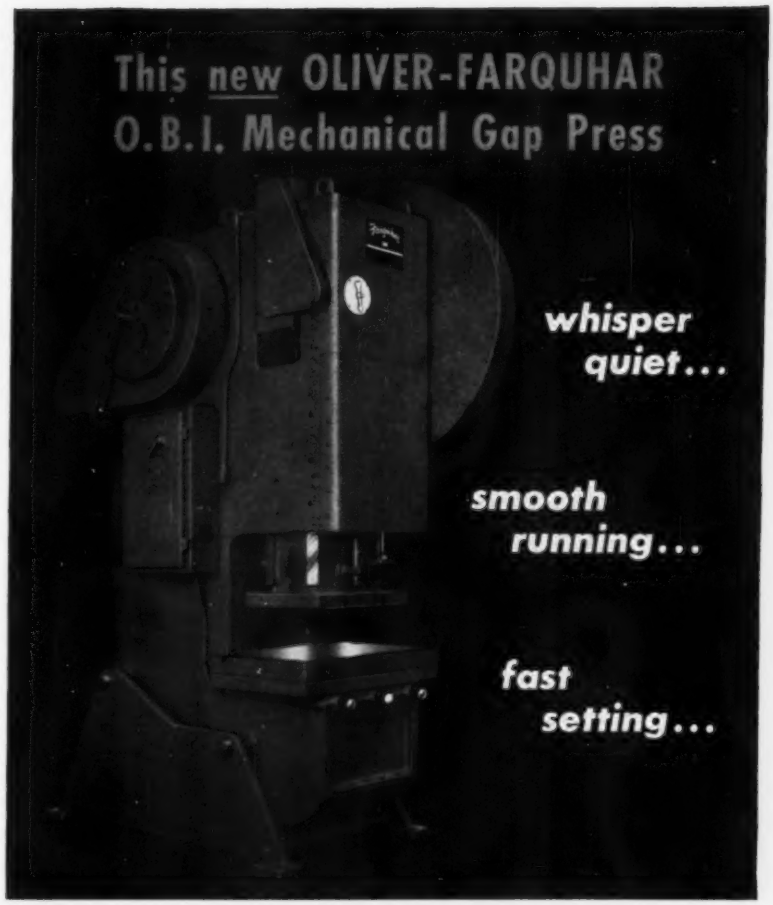
### Carborundum Expanding

New plant facilities, estimated to cost $6 million, are under construction at Niagara Falls. Plant will turn out 4 to 14-in. grinding wheels.

### Canadian Distributor Named For Lodge & Shipley Lathes

J H Ryder Machinery Co, Ltd, has been appointed distributor throughout the Dominion of Canada for the entire line of L&S heavy duty precision lathes. The Ryder organization, one of Canada's largest machinery distributors with offices in Ham-

*"I knew there was something suspicious about Denton's 'moonlighting' job—he's in jail for it."*


**for dependable high production**

You'll want new Oliver-Farquhar O.B.I. Mechanical Gap Presses for blanking, forming, drawing, bending and assembling operations. Designed and built into these O-F presses are features such as these . . .

- Rigid welded rolled steel frame with side members of uniform thickness.
- Box type slide construction with long gibs and gibways—constant, dependable alignment.
- Pneumatic counterbalance cylinders—slides and dies "float" to reduce shock.
- Continuously rotating low inertia type clutch—higher cycling, cooler operation, low maintenance.
- Adjusting screw fully-guided, large-diameter, long-barrel type —easy adjustment at floor level.
- Built to J. I. C. (Joint Industry Conference) Standards—for in-service uniformity.
- Available in four models—75, 110, 150 and 200-Ton capacities.

Write, wire or phone for complete details on the new, heavy-duty, Oliver-Farquhar O.B.I. Mechanical Gap Presses now available for delivery.

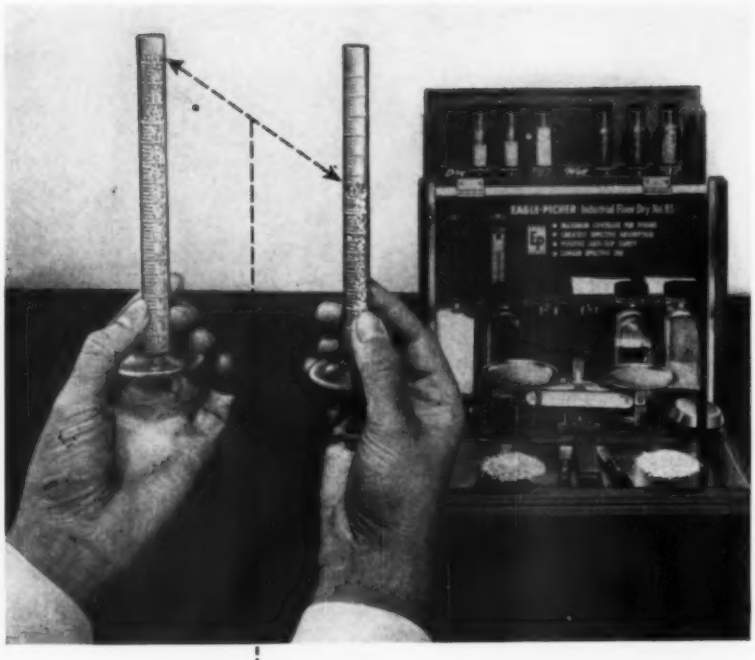
**A. B. FARQUHAR DIVISION**
**The Oliver Corporation**
**Press and Special Machinery Departments**
**York 10, Pennsylvania**

OLIVER Farquhar PRESSES

*Also Manufacturers of Farquhar Conveyors*




CIRCLE 283 READER SERVICE CARD



There's a BIG difference in floor absorbents

# TEST IT Yourself!

**IN YOUR OWN OFFICE,** make this simple 15-minute test. Compare Eagle-Picher Industrial Floor-Dry to any other floor absorbent.

**HERE'S WHAT YOU'LL PROVE TO YOURSELF** about safe, skid-proof Eagle-Picher Floor-Dry: It's extremely insoluble, absorbs more oil and water. It goes further, provides much greater coverage. It reflects more light, brightens the work area. It's non-combustible, has no chemical reaction. It lasts longer, saves you money!

*Since 1843* EAGLE EP PICHER

**WRITE TODAY.** Our Eagle-Picher representative will bring the portable laboratory to your office where you may make this test yourself. The Eagle-Picher Company, Cincinnati 1, Ohio.

## Field Report . . .

ilton, Windsor, Winnipeg, Vancouver, and Montreal, has handled the L&S line of heavy duty squaring shears and power press brakes for many years. In addition to distributing the company's US-built units, Ryder will handle all sales and services of the English-built Lodge & Shipley CVA Power-turn lathes.

### New DeVilbiss Subsidiary

Establishment of a new wholly owned subsidiary, DeVilbiss Metal Fabricators Co, Detroit, will enable the company to provide complete finishing systems to industry. New firm is the result of the consolidation of the Peters-Dalton Division of Detroit Harvester Co and Newcomb-DeVilbiss Co.

### Bryant Chucking Grinder Co Re-Names a Division

The Bryant Gage and Spindle Division at Springfield, Vt, has been reorganized and re-named Bryant Computer Products Division. It'll concentrate solely on design and production of magnetic storage devices for use in the electronic computer field. Manufacturing facilities have been increased to meet the increasing demand for standard and special magnetic memory drums.

### $29 Million Contract to Bendix

Two Navy guided missile contracts totaling $29 million have gone to Bendix Aviation Corp's Products Division. One $21.5 million order is for Talos production to be carried out at the Mishawaka, Ind, plant operated by Bendix for the Bureau of Ordnance. Second contract, $7.5 million, is for Talos missile advanced engineering.

*"I was hoping you wouldn't notice. It goes straight to my house."*

## NAMES IN THE NEWS...

**J A Gehling** has been appointed a vice president of White Sewing Machine Corp, Cleveland. He will continue to serve as general manager of White's Apex Reinforced Plastics Div. Also named company vice presidents: **R E Isaacson,** general manager of the sewing machine division; **E E Stvan,** general merchandising manager of the industrial supplies and machinery distributing organizations; and **T S Bednar,** general manager of the Strong, Carlisle & Hammond Division.

**William F Crawford,** vice president of Republic Flow Meters Co, Chicago subsidiary of Rockwell Manufacturing Co, has been named president of Republic. **James D Cunningham,** founder of the company, has been elected board chairman. Mr Crawford, a vice president of Rockwell, also heads Edward Valves, Inc, East Chicago, Ind, and Valve Products, Inc, Knox, Ind, both Rockwell subsidiaries.

**Edward G Maylinger,** vice president and treasurer of Ettco Tool & Machine Co, Brooklyn, has been elected president. **Kenneth W Meytrott,** formerly vice president, has been named board chairman. In their new posts the men succeed the late **Melvin H Emrick,** chairman and president since 1947 (*AM*—July 28, p142).

**John Mullenmaster** has been elected vice president and sales director of Owatonna Tool Co, Owatonna, Minn. Prior to the appointment he was industrial sales manager.

**Burton J Naden** has been appointed to the new post of general sales manager of Vascoloy-Ramet Corp, Waukegan, Ill. He was formerly assistant manager of the General Products Department.

**I K Schlamp** has been promoted from factory manager to general manager of Standard Screw Co's Ravenna Metal Products Division, Seattle.

**Donald R Spotz** has been appointed vice president, sales, for Pesco Products Division and Wooster Division of Borg-Warner Corp, Bedford, Ohio. He was formerly Pesco general sales manager.

**John E Slaughter Jr** and **James W Dunham** have been named vice presidents of Allbright-Nell Co, subsidiary of Chemetron Corp, Chicago. Mr Slaughter is president of Cheme-

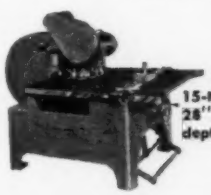
LOCATE and PIERCE
in ONE HIGH SPEED OPERATION

. . . even intricate hole patterns are duplicated at almost unbelievably high speed with Wiedemann Turret Punch Presses—from prototype to medium production runs.

Using the high speed follower gauge, illustrated, openings are pierced in printed wiring boards, chassis, panels, truck and other fabricated parts at rates of 30 to 120 holes per minute. Other rapid gauging methods are also available—assuring you a Wiedemann that suits the size and nature of your work.

High speed operation is just one of the many ways a Wiedemann can cut your short run piercing costs 60% to 90%. Get all the facts. Send drawings of your work for time study and write for Bulletin 301.

*12 to 32 Punches and Dies Ready for Use*



RA-41P Wiedemann
15-ton capacity
28" throat depth

Other models from 4 to 150 tons

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AM-8 — Gulph Road . . . King of Prussia, Pa.




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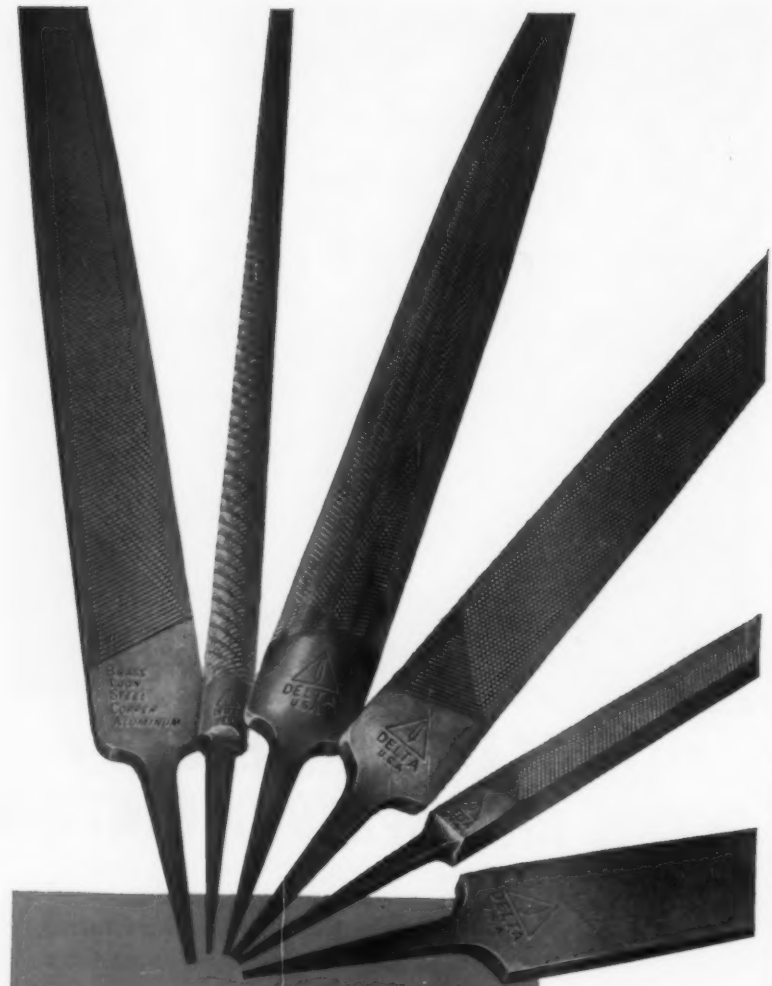


tron's Girdler Process Equipment Division, Louisville, Ky; Mr Dunham is a Chemetron vice president.

**I. T Johnston,** vice president, sales, Armco Steel Corp, Middletown, Ohio, has been elected executive vice president of the company. **W B Quail,** formerly general manager of Armco Div sales, and **W S Newell,** formerly general manager of Sheffield Div sales, have been elected vice presidents of the company in charge of steel sales in their respective divisions.

**A F Anzlovar** has been appointed vice president and general manager of Mercast Manufacturing Corp, La Verne, Calif, subsidiary of Mercast Corp of Califonia.

**J M Moon** has been elected executive vice president of the Signode Steel Strapping Co, Chicago. Formerly vice president, sales, he will continue to direct sales activities.

**Howard M McCoy** has been named assistant to the executive vice president of Marquardt Aircraft Co, Van Nuys, Calif. He was formerly associated with Ramo-Wooldridge Corp.

**Robert T Blakely** has been appointed corporate staff engineer, a new post in the executive engineering office of Burroughs Corp, Detroit. Mr Blakely's headquarters will be at Control Instrument Co, Brooklyn subsidiary where the Series G electronic high speed printing and tabulating machine is being produced.

## OBITUARY

**Frederic H Chapin,** 83, chairman of the board of National Acme Co, Cleveland, died August 5 in his home. Mr Chapin resigned as president of the company last November. He had served as president since 1926 and board chairman since 1933. At the time of his death he was also chairman of the board of Ohio Machine & Forge Corp.

# SPECIAL MACHINE TOOLS

**Special Machine**
with 4 spindles
for rough and finish milling of the inner spherical cage in differential cases.

Output:
**80** components
per hour

Full automatic working cycle including automatic inserting and changing of tools

**LUDWIGSBURGER MASCHINENBAU GMBH**
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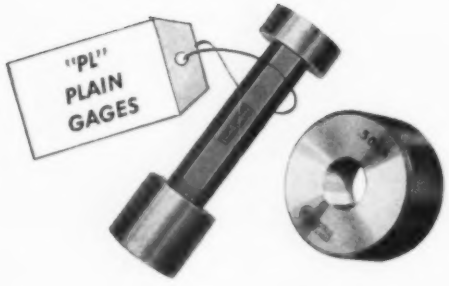
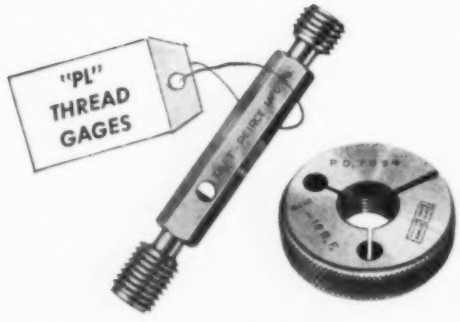
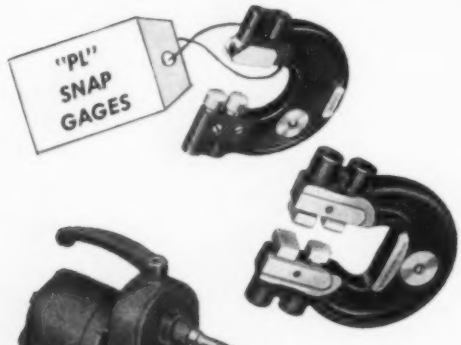
# Lower Costs, Improve Quality
## WITH
# Taft-Peirce
# "PL"* Fixed Gages



*"PL" — Precision Lapped, your assurance of these Taft-Peirce Quality Extras . . . accurate sizing, controlled geometry, long lasting wear life.

**Taft-Peirce Cylindrical Plug and Ring Gages** are furnished in hardened steel, with Electrolized or Chrome hard facing, or with Carbide or Norbide inserts . . . a surface treatment for every gaging requirement.

**Taft-Peirce Thread Plug and Ring Gages** are available in hardened steel or Electrolized. Thread plugs also are available in Tungsten Carbide for exceptional wear resistance.

**Taft-Peirce Plain Adjustable Snap Gages** are available with pin type, round, or square anvils, and regular or midget frames. Gaging members of chrome alloy steel, Tungsten Carbide or Norbide inserts. Adjustable Thread Snap Gages available with Tungsten Carbide anvils. Also, Roll Thread Snaps for longer service life.

**Mechanize Thread Gaging with the Taft-Peirce Rotochek.** Simplified, accurate, low-cost method for quantity inspection of threaded parts.

**TAKE IT TO TAFT-PEIRCE** T P

TAFT-PEIRCE MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND


## Free Literature

To order any of these bulletins, circle corresponding number inside back cover.

### MACHINES AND ATTACHMENTS

**1** ROLL GRINDERS — *Cincinnati Grinders Inc, Cincinnati 9, Ohio.* 28-page publication G-700 presents illustrated description of Filmatic traveling wheelhead roll grinding machines available in four sizes, 36, 44, 50, and 60 in. Attachments and accessories covered.

**2** HORIZONTAL BORING MILLS — *Cincinnati Gilbert Machine Tool Co, 3366 Beekman St, Cincinnati 23, Ohio.* 4-page illustrated bulletin 1157 gives details on 4- and 5-in. table type horizontal boring, drilling, and milling machines. Pendant control and other design features described, specifications included.

**3** MULTIPLE SPINDLE BAR AUTOMATIC—*National Acme Co, 170 E 131st St, Cleveland 3, Ohio.* 8-page bulletin MRA-58 illustrates and describes the Acme-Gridley 7/16-in. RA-6 for either long or short run production of small to miniature components. Construction features, standard accessory attachments for threading and tapping, high-speed drilling, pick-off and back-finishing, and accelerated reaming covered.

**4** FLAME CUTTING MACHINE — *Air Reduction Sales Co, 150 E 42nd St, New York 17, NY.* 8-page catalog 804G (form ADC 673) presents illustrated description of Airco No. 20 Radiagraph unit, a portable, motor-driven, straight-line, track-guided machine. Limited contour, circular and curved cutting can be done by use of suitable accessories which are also described.

**5** AUTOMATIC SETSCREW DRIVER —*Standard Pressed Steel Co, Jenkintown, Penna.* Illustrated 4-page bulletin gives details on the Setomatic for use in fully automated production lines or as an attachment for a single machine. The device automatically feeds, inserts, and tightens socket setscrews in diameters from No. 4 to ⅝ in., in lengths up to ¾ in. Speeds up to 2500 installations per hr are possible.

**6** BANDSAWS—*W Whitney Stueck, Inc, Old Saybrook, Conn.* 4-page illustrated folder describes new Connecticut model that can perform both low-speed sawing and high-speed friction cutting. Specifications, optional features and equipment included.

**7** CHEMICAL MILLING OF CASTINGS—*US Chemical Milling Corp, 1700 Rosecrans Ave, Manhattan Beach, Calif.* 6-page Design Bulletin No. 7 deals with tolerances attainable, suitability, overall and controlled area reduction, surface finishes that can be consistently expected.

### TOOLS AND ACCESSORIES

**8** DRILLS—*Precision Twist Drill & Machine Co, 10 Woodstock St, Crystal Lake, Ill.* 40-page catalog C-58, with prices, covers complete line including new carbide and carbide-tipped drills and reamers.

**9** LUBRICANTS—*Keystone Lubricating Co, 5100 N 21st St, Philadelphia 20, Penna.* 20-page bulletin BK-19-a describes eight products said to cover 50% of all industrial requirements. Applications, advantages, characteristics, densities, specifications, container sizes included.

**10** DIAMOND WHEELS AND HONES —*Simonds Abrasive Co, Tacony & Fraley Sts, Philadelphia 37, Penna.* 20-page catalog contains tabular data on products available in resinoid, vitrified, and metal bond. Ordering information and prices included.

**11** BORESCOPES — *Lenox Instrument Co, 2012 Chancellor St, Philadelphia 3, Penna.* Illustrated folder describes line ranging in size from a few inches to more than 60 ft in length for every type of internal visual inspection. Details on three interchangeable viewing heads, plus available accessories included.

**12** TEMPERATURE CONTROLS — *United Electric Controls Co, 79 School St, Watertown 72, Mass.* Literature provides details on Type C11, a heavy-duty device for use in engine cooling systems, and Type E32N, an indicating temp control for ovens, baths, in molding machines, etc. Electrical rating on both is 15 and 20 amps 115/230 v ac.

**13** LIQUID LEVEL CONTROL—*B/W Controller Corp, 2200 E Maple Rd, Birmingham, Mich.* 16-page catalog illustrates and describes system that operates without floats and with no moving parts in the liquid. Covers liquid level relays, electrodes, signals, alarms, and alternators with charts and diagrams of typical applications.

**14** SAWS—*Capewell Manufacturing Co, Governor St, Hartford, Conn.* 20-page net price selector contains tabular data on line of hand and power hacksaws, bandsaws, hole saws, hammers and ground flat tool steel.

**15** TEMPERATURE INDICATOR—*Illinois Testing Laboratories, Inc, 420 N LaSalle St, Chicago 10, Ill.* 8-page bulletin 2002 contains information on the Alnor Pyrotac, an excess temperature protective device that sounds an alarm and/or shuts down upon reaching the safe max temperature. Includes specifications, schematic application wiring diagrams, discussion of operating principle.

**16** ELECTRON MICROSCOPE—*Philips Electronics, Inc, Instruments Div, 750 S Fulton Ave, Mount Vernon, NY.* 6-page folder contains engineering data on Norelco EM-100B. Covers electron optical system, source, condenser lens, objective lens, and intermediate lens systems, photographic equipment including 35mm, 2x2-in. plate and front-end cameras.

**17** SOLID FILM LUBRICANT—*Hohman Plating & Manufacturing Co, 814 Vermont Ave, Dayton, Ohio.* Bulletin describes Surf-Kote H-108, an inert coating that provides low coefficient of friction, excellent wear life, and eliminates galling, seizing, cold welding, and fretting corrosion. Applications and performance curves included.

## HEAT TREATING AND WELDING

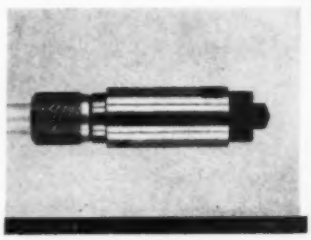
**18** CUTTING TORCHES — *Linde Co, Division of Union Carbide Corp, 30 E 42nd St, New York 17, NY.* 6-page bulletin (Form 1174) gives data on complete line of Oxweld flame-cutting equipment, manual and machine. Torches described can be used interchangeably with every fuel gas combination, oxy-acetylene, oxy-propane, and oxy-natural gas. Equipment can be used on all flame-cutting jobs from thinnest sheet metal to risers 10 ft thick.

**19** HARDSURFACING ELECTRODES AND WIRE—*A O Smith Corp, Welding Products Div, Milwaukee, Wis.* 12-page bulletin MW-222 contains data on more than 25 different electrodes and wires. Checklist of uses aids in selecting correct item to use on more than 400 different types of welding equipment.

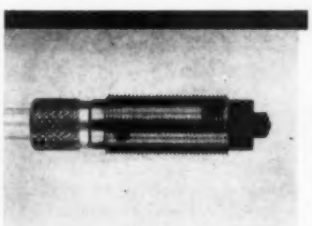
**20** BRONZE WELDING ELECTRODES —*Ampco Metal, Inc, 1745 S 38th St, Milwaukee 46, Wis.* Series of reference data charts provides information on comparative bronze electrodes, melting rates and efficiencies, electrode and filler rod specifications, recommended welding currents. Data included on all arc welding processes, with necessary equipment, type and size of electrode or rod, and polarity.

This is a Taft-Peirce Air Capsule shown with No. 9585 Height Gage Stand and Model E CompAIRator Air Gage. The Capsule is an air-actuated, direct contact measuring device that can be substituted for dial indicators in hundreds of shop inspection operations.

**NEW Air Capsule Provides Low Cost Accuracy for Gaging and Quality Control**



Taft-Peirce Air Capsules measure only 1½" long overall x .375" diameter. The Plain Body Type shown above clamps easily on standard shop measuring tools, or may be built into special gaging fixtures.



The Threaded Body Air Capsule is identical with the Plain Body Type, but features extra fine pitch body threads for applications where the Capsule must be critically positioned or moved slightly along its axis at frequent intervals.

From toolroom to transfer line, this new Taft-Peirce Air Capsule creates exciting new opportunities to apply high magnification, visual gaging to all kinds of close tolerance inspection work.

Clamp the Capsule on height gage or surface gage for precise work checking on a surface plate. Substitute it for dial indicators or micrometer heads when designing gaging fixtures. Take advantage of its long-wearing carbide contact point by using it as a sensing device for continuous process inspection.

A Taft-Peirce Air Capsule operates with any CompAIRator Air Gage at any standard magnification, allowing you to spread a few thousandths of an inch over a wide dial expanse, with each graduation equal to a tenth or finer. Available in short range models (0 — .004"), and long range models (.004" — .040"), with plain or threaded bodies. Also supplied with integral 90° adaptors for use where a tight mounting location might cause pinching of air hose.

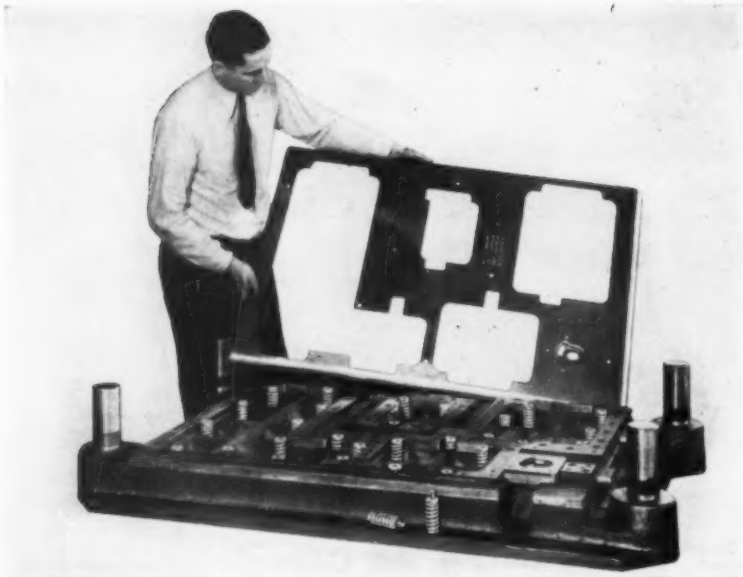
No matter what your gaging application may be, a low cost, easy-to-use Taft-Peirce Air Capsule gives you mounting versatility plus all the CompAIRator advantages of high magnification, quick response, outstanding accuracy. Write today for more information.

**TAKE IT TO TAFT-PEIRCE**

TAFT-PEIRCE MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND




CIRCLE 289 READER SERVICE CARD



the **STRIPPIT** that gave us our name...brings you

**lower tooling costs!**

**A REVOLUTION IN DIE-MAKING.** The famous "Strippit," invented by Wales Strippit Company, saves tool engineers and die-makers endless hours of designing and building stripping mechanism into die sets. These compact, telescoping spring-and-retainer units provide standardized stripping pressures for uniform stripping of blanks from dies. Strippits eliminate spring grinding . . . stripper bolts . . . drilling and counterboring for stripper bolts . . . boring spring pockets . . . permit use of thinner, easier-to-machine stripper plates . . . eliminate turning over the punch holder and die shoe castings after the back sides have been planed. Strippits pay for themselves many times over on every job.

**LOWER COST MULTIPLE PIERCING AND NOTCHING.**

Strippit self-contained hole punching and notching units, provide the most economical way to notch up to ⅛" mild steel and punch flats, structurals and extrusions up to ¾" mild steel. These units are quickly set up in any pattern, placed in the press without loss of press time and actuated by the ram. Interchangeable standard or special tools . . . fast setup changes . . . re-usability of all units . . . give you high production plus flexibility for quick, economical design changes. Write today for complete engineering details and if you desire, a demonstration by a Strippit mobile unit at your plant. No obligation, of course.

Warehouse stocks in Chicago and Los Angeles.

HOUDAILLE INDUSTRIES, INC.

WALES **STRIPPIT** COMPANY

**200 Buell Road, Akron, New York**

*Manufactured in Canada by Strippit Tool and Machine Limited, Brampton, Ontario*

## Free Literature

To order any of these bulletins, circle corresponding number inside back cover.

**21** HIGH FREQUENCY MOTOR GENERATOR — *Safety Industries, Inc, Electrical Division, PO Box 904, New Haven, Conn.* 5-page bulletin SK-4897 illustrates and describes features of Star-Kimble vertical, water-cooled, indicator-type sets for induction heating and melting. Electrical characteristics include ratings from 175 to 300 kw at 1000 cycles; 15 to 300 kw at 3000; 20 to 100 kw at 4200; and 15 to 250 kw at 10,000.

**22** SPOT WELDER CONTROL — *Taylor-Winfield Corp, Warren, Ohio.* 4-page illustrated bulletin 10-613 describes counting tube type of precision control for tri-phase electric resistance spot welders. Control is particularly suited for dc rectifier type welders mechanically operated by air or hydraulic fluids. Provides precise timing control useful in processing aluminum and magnesium alloys, low carbon and stainless steels, hardenable steels, nickel, alloys, titanium.

### PLANT SERVICE EQUIPMENT

**23** HYDRAULIC PUMPS—*SC Hydraulic Engineering Corp, 6318 Central Ave, Los Angeles 1, Calif.* 6-page folder gives details on new 10-500 series of air-operated units, available in nine sizes, capable of producing from 500 psi to 25,000 psi hydraulic pressure from a max of 100 psi air pressure. Either oil or water may be used as fluid medium.

**24** FANS—*Chicago Blower Corp, 2867 Pacific Ave, Franklin Park, Ill.* Illustrated 4-page folder covers complete line of centrifugal, general ventilation, exhauster, and axial airfoil fans, turbo pressure blowers, induced draft fans and roof ventilators. Chart indicates size and capacity of each; applications described. Fans are capable of air movements from 220 to 324,-960 cfm.

**25** MULTI-ZONE AIR CONDITIONING UNIT—*American Air Filter Co, 215 Central Ave, Louisville 8, Ky.* 8-page bulletin 870 presents illustrated description of new Herman Nelson line, including components, accessories, capacity and specification data. Single central station unit can handle from 2 to 8 zones. Eight sizes are available with air capacities ranging from 3400 to 36,000 cfm.

**26** MATERIALS HANDLING EQUIPMENT—*Syntron Co, 311 Lexington Ave, Homer City, Penna.* 64-page catalog 586 illustrates, describes and gives specifications for products including vibrators, flow control valves, electromagnetic feeders, conveyors, elevators, parts feeders. Also covered are lapping and polishing machines, infra-red heating elements and panels.

**27** FEMA HANDBOOK OF SAFETY CODES—*Fire Equipment Manufacturers' Association, Inc, One Gateway Center, Pittsburgh 22, Penna.* 42-page manual outlines various procedures for maintaining, protecting, recharging, and inspecting fire extinguishing equipment commonly used in the metalworking industry.

**28** FLOOR TRUCKS — *Lewis-Shepard Products, Inc, Dept RS-18, 125 Walnut St, Watertown 72, Mass.* Illustrated circular 29-D, 6 pages, contains brief descriptions of 52 4-wheel floor trucks for special and standard materials handling jobs.

**29** GRAVITY CONVEYOR — *Rapids-Standard Co, 342 Rapistan Bldg, Grand Rapids 2, Mich.* 12-page bulletin RR-58 contains information on the Rapid-Roller conveyor. Describes construction fea-

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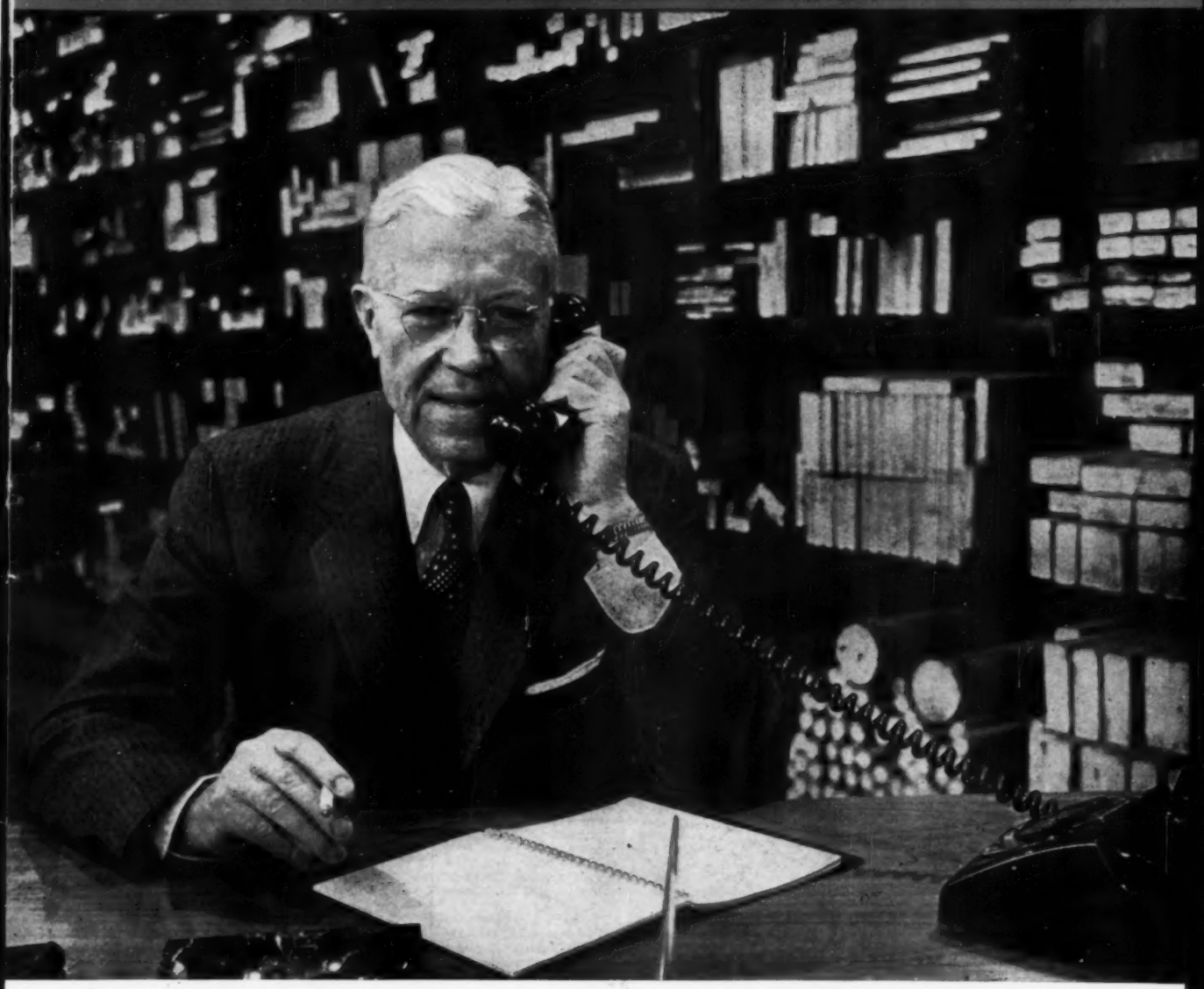

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tures, typical applications, accessories. Specifications, weights, and capacities in tabular form.

### PARTS AND MATERIALS

**30** QUADRUPLE REDUCTION SPEED REDUCERS—*Link-Belt Co, Prudential Plaza, Chicago 1, Ill.* Folder 2651-A, a 6-page supplement to Link-Belt Book 2651, contains complete data on hp ratings, dimensions, mounting information and construction principles applying to the new line. Also covers two sizes of double reduction helical gear drives and three sizes of triple reduction helical gear drives in addition to the five sizes of quadruples.

**31** ROLLER CHAIN DRIVES—*Maurey Manufacturing Corp, Information Div, 2915 S Wabash Ave, Chicago 16, Ill.* 8-page catalog D-58 presents illustrated descriptive information on new line. Covers bushed type and plate sprockets, XBS interchangeable bushings, Ful-Grip Q-D bushings for larger sprockets, and single strand and double strand roller chains.

**32** CYLINDERS—*Petch Manufacturing Co, 463 York St, Detroit 2, Mich.* 6-page catalog PMC58 includes engineering data and complete specifications of Power Master line of air and low pressure hydraulic cylinders. Covers 1½ to 6-in. bores in eleven standard mounting types, along with parts and accessories.

**33** HYSOL TOOLING MATERIALS—*Houghton Laboratories, Inc, Tooling Div, Olean, NY.* 6-page technical bulletin T1A contains new and more complete information and consolidates data previously contained in five single bulletins. Hysol tooling compounds, including gel or surface coating compounds, laminating compounds, casting, and high-temp compounds are listed in tabular form. Handling and physical characteristics tabulated as well as hardeners for special applications.

**34** COIL WEIGHT AND LENGTH CALCULATOR—*F J Littell Machine Co, 4101 N Ravenswood Ave, Chicago 13, Ill.* Calculator determines weights and lengths of steel, brass, and aluminum coils. ID and OD of the coil, width and thickness of the stock are all the user needs to know to operate the calculator.

**35** PRO-FAX PLASTIC — *Hercules Powder Co, Wilmington 99, Del.* 10-page illustrated technical bulletin discusses Hercules polypropylene, an extremely light plastic. Appications include automotive, business machines, home appliances, refrigerator parts. Chart lists injection molding characteristics.

**36** SUB-MINIATURE SWITCH — *Micro Switch, Div of Minneapolis-Honeywell Regulator Co, Freeport, Ill.* Illustrated data sheet 148 gives data on Model 1SX1-T. Weighing 1/28th of an ounce and measuring 0.2 x 0.35 x 0.5 in. (on the case) switch reportedly provides electrical capacity and mechanical characteristics equivalent to units twice its size.

**37** FINISHED BORE SPROCKETS — *Acme Chain Corp, Holyoke, Mass.* Brochure lists 99 sprocket sizes, 933 different bores, with list prices complete with standard keyway and setscrew, ready for installation.

**38** SILICONES—*Silicones Div, Union Carbide Corp, 30 E 42nd St, New York 17, NY.* 4-page data sheet SF-1128 discusses use of Union Carbide silicones in the shell molding industry. Describes properties, advantages, and effective working concentrations of three silicone parting agents.


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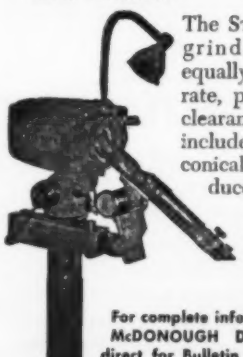

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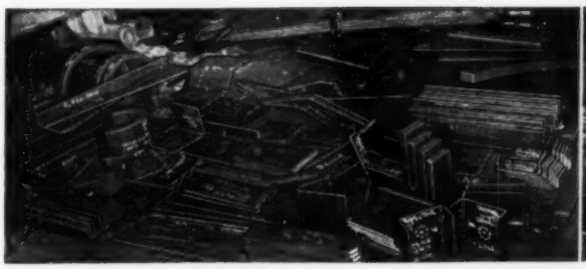

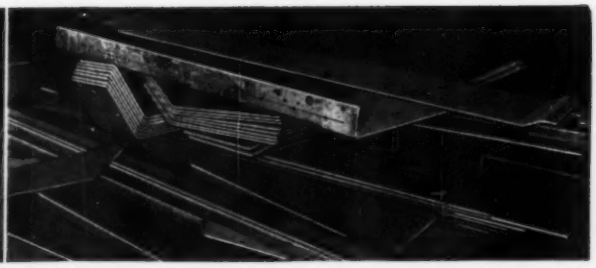

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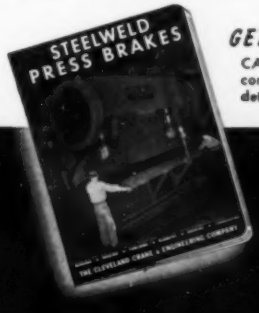


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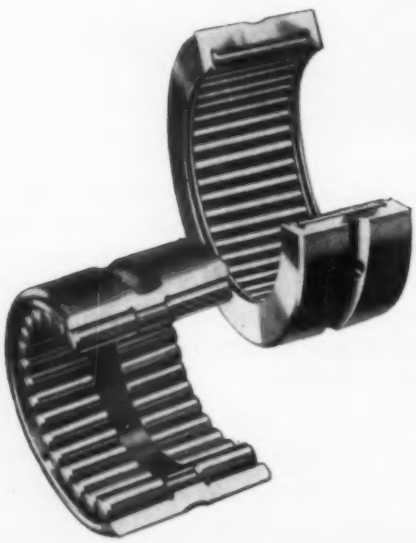

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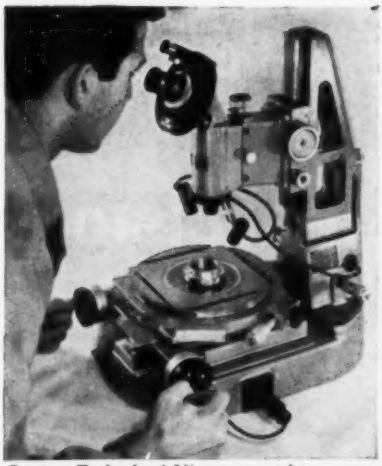

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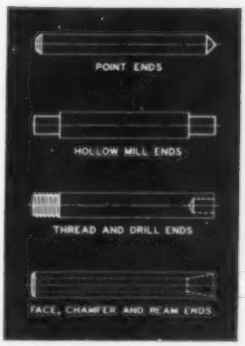


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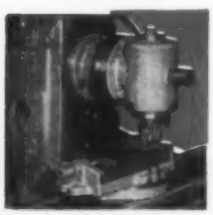

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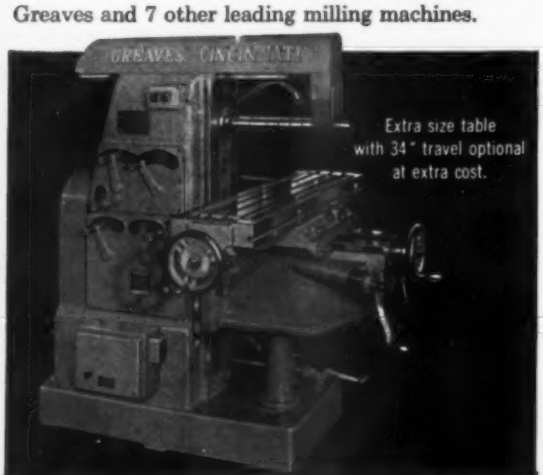


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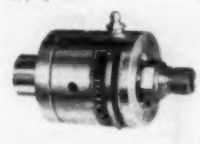

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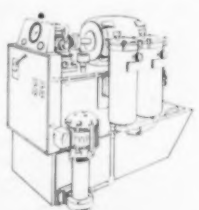

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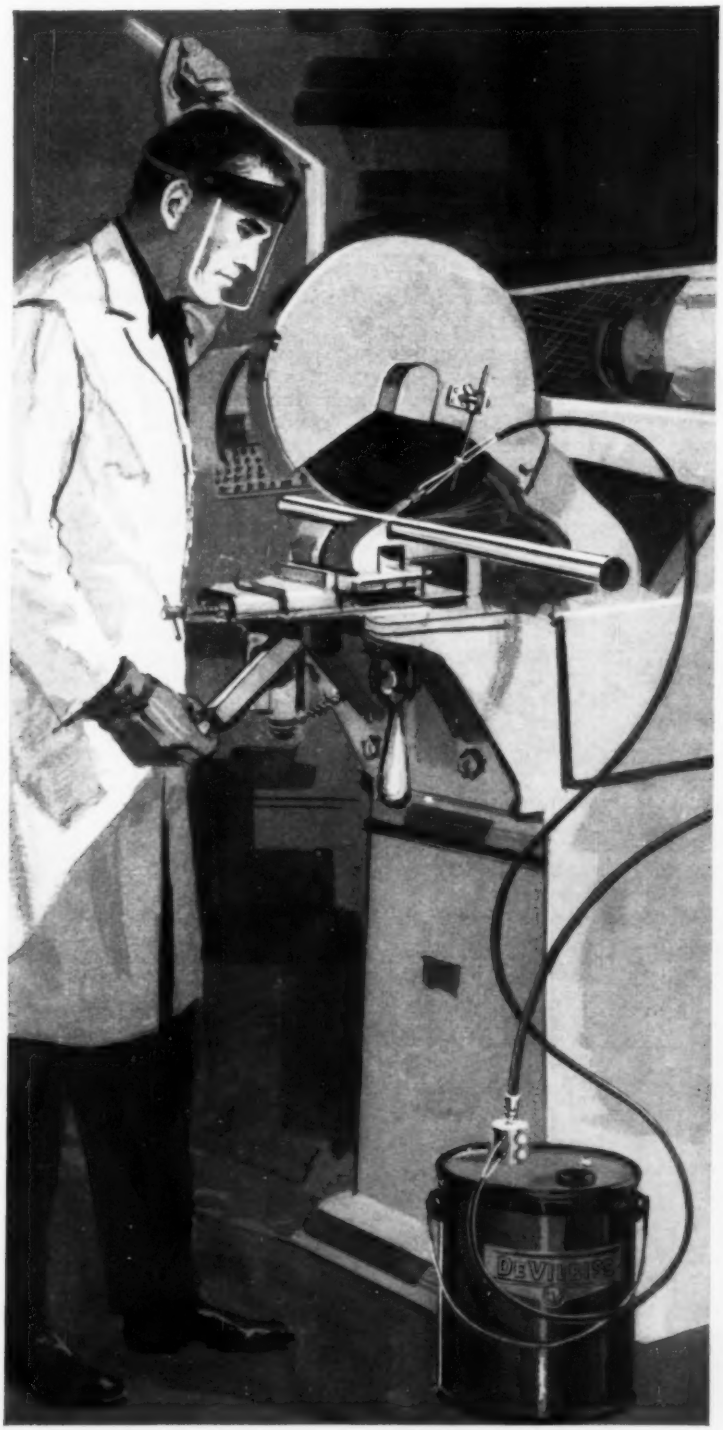


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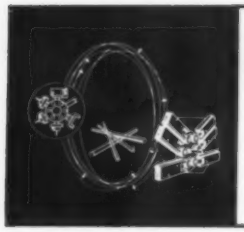


# MACHINING ALUMINUM

OPERATOR REPORTS

This report is one of a series by Deo Blott, Technical Specialist,
Kaiser Aluminum & Chemical Sales, Inc.

# Tapping aluminum on automatic screw machines

HIGH SPEED STEEL TAPS are generally recommended for automatic screw machine work. Carbon steel taps can be used for hand tapping. Although standard taps are commonly used for tapping aluminum alloys, special taps ground for aluminum will often give better results.

## Tap Design and Grinding

Spiral-fluted taps are sometimes used to draw the chips out of deep or blind holes, and are especially useful when tapping aluminum (as shown in Fig. 1). Taps for aluminum should have ground threads with deep, wide and polished flutes. Hook and rake angles should include the first full tooth.

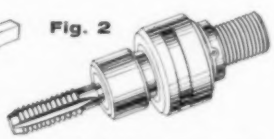
Where conditions are poor for rigid alignment of tap and work with advance of tap matched to lead or pitch, floating holders are sometimes used to avoid oversize holes, breakage, or excessive tap wear. The holder should be able to float both angularly and at right angles to its axis to avoid a tendency to cramp work or tap (as shown in Fig. 2).

Most regular stock taps are ground with 5 degree rake, but for best results with aluminum alloys, the cut-

Fig. 1

Spiral fluted tap for tapping aluminum

Fig. 2



Floating holder overcomes poor alignment conditions

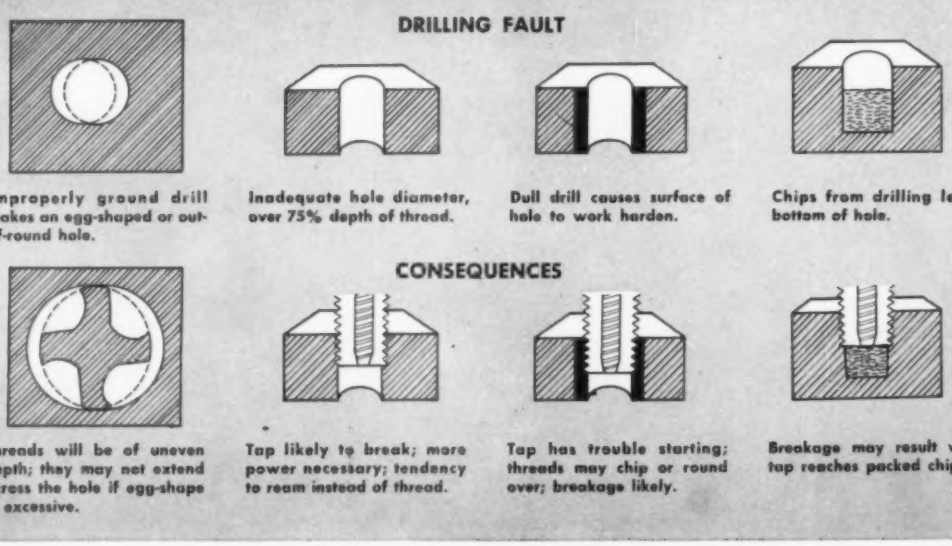
Fig. 3

Lip hook on straight flute tap increases rake

Fig. 4

Fluteless tap internally rolls threads

**Fig. 5 FAULTY DRILLING PRACTICES CAUSE TAPPING FAILURES**


DRILLING FAULT
Improperly ground drill makes an egg-shaped or out-of-round hole.
Inadequate hole diameter, over 75% depth of thread.
Dull drill causes surface of hole to work harden.
Chips from drilling left in bottom of hole.
CONSEQUENCES
Threads will be of uneven depth; they may not extend across the hole if egg-shape is excessive.
Tap likely to break; more power necessary; tendency to ream instead of thread.
Tap has trouble starting; threads may chip or round over; breakage likely.
Breakage may result when tap reaches packed chips.

ting face should be ground with 10 to 20 degrees rake or hook. This can be obtained on straight flute taps by grinding a lip hook into the end of the tap, (as shown in Fig. 3) and should include the chamfer and first full thread. This hook will sometimes force chips ahead of tap, which may be objectionable on some screw machine jobs.

Figure 4 illustrates a fluteless tap which cold forms internal threads. Threads are formed in the metal under pressure. The grain fibers follow the contour of the threads and are not cut away.

## Tapping Operation and Practices

The sizes of drilled holes are especially important when close tolerance is a factor (see Fig. 5).

If the hole is too small, the tap must remove an undue amount of solid stock in addition to cutting the threads. This can produce a rough thread, excessive tool dulling, or breakage.

If the hole is too large, the holding power of the thread will be greatly lessened because of the shallowness of the threads. Seventy-five per cent of full is considered sufficient for most requirements. Undue strain on the tap is avoided and the holding power of the threads is near that of full threads. Standards have been established for tap drill sizes that will produce threads from 62 per cent to 81 per cent full, depending on the pitch and diameter of the thread and tap.

If, due to unusual requirements, specifications for minor diameters of tapped holes are especially exacting, it may be impractical to hold tolerances with a tap drill alone. Reaming may then be necessary. In such case, the tap drill should be from 0.006 to 0.012 inch smaller than the tap diameter.

If a tap is cutting too small, grinding more rake on the cutting edges will often help. Resharpening without any change in form helps to a lesser degree. A dull tap cuts closer to size than a sharp one. If the chamfer relief is increased, it enlarges the hole; this also happens if the lands on the chamfer portion are ground to unequal heights.

The speed at which taps can be efficiently operated depends on a number of variables, such as composition and hardness of the material to be tapped, depth of hole, type and condition of machine used for tapping and the cutting fluid used. For these reasons, tapping speeds given below should be taken as general guides and not as hard-and-fast rules:

| | |
|---|---|
| 3 to 8 threads per inch . . | 50 to 75 SFPM |
| 9 to 15 threads per inch . . | 90 to 125 SFPM |
| 16 to 24 threads per inch . . | 125 to 150 SFPM |
| 25 and finer . . . . . | 150 to 200 SFPM |

* * * *

The tooling information presented above was condensed by Deo Blott from Kaiser Aluminum's library of helpful screw machine information. This information is available to screw machine operators upon request.

And to further help you machine aluminum effectively, Mr. Blott will go to your shop to recommend practices proved best by operators experienced in aluminum.

For full details of Kaiser Aluminum customer services available to you, and for your complete set of the informative "Operator Reports" series, call your local Kaiser Aluminum representative or write: Kaiser Aluminum & Chemical Sales, Inc., 919 N. Michigan Ave., Chicago 11, Ill.

**What the designer conceives . . . aluminum achieves!**

**How Kaiser Aluminum "Designer Series" ads are helping to build business for you!**

These six words—"what the designer conceives, aluminum achieves"—are the theme for a complete advertising campaign directed to parts designers. The campaign is helping persuade them to *specify aluminum* in screw machine parts.

You can take advantage of their growing interest by presenting to *your* customers the same advantages of aluminum in screw machine production that Kaiser Aluminum is presenting to designers (below):

**(1.) Why Design Parts For Screw Machine Production?**

1. Starting material is a wrought product which gives high properties in the finished part.
2. Excellent finishing possibilities.
3. Closer tolerances and more intricate parts possible.
4. Very fine threads possible.
5. Excellent concentricity is guaranteed.
6. Fewer rejects for porosity.
7. Fewer secondary operations necessary.
8. Modification of parts in production easier and less costly.
9. Wide range of equipment and facilities available throughout the country.
10. Lower costs for production tooling, dies, set-up.
11. Lower costs for actual production.
12. Lower costs for finished parts.

**(2.) Why Design For Production In Aluminum?**

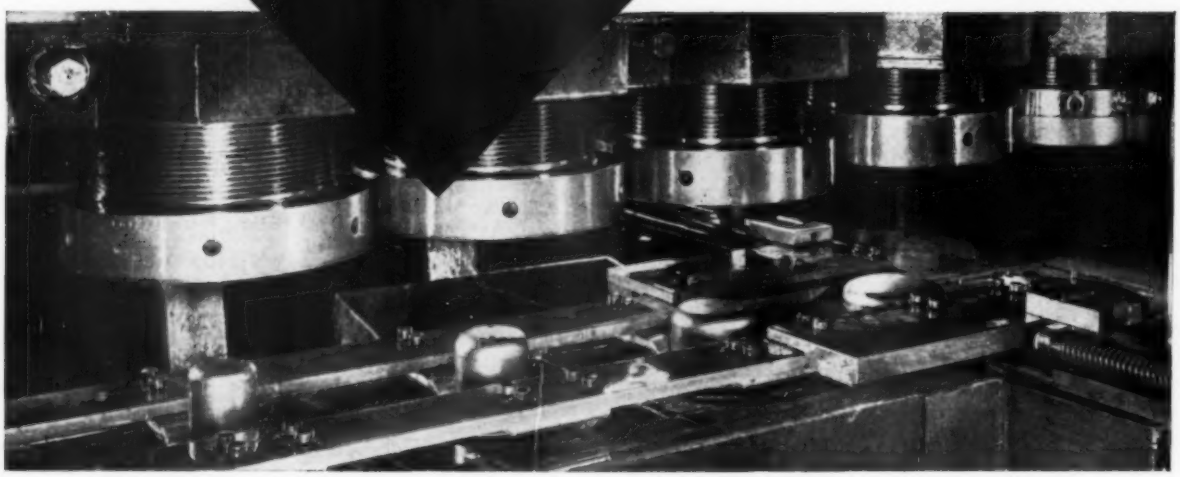
1. Light weight—moving parts present less resistance to applied force, wear less; chips float out of recesses better for cleaning finished parts.
2. Greater conductivity.
3. Corrosion resistant.
4. Non-sparking.
5. Non-magnetic.
6. Lower raw material cost per part.
7. Less price fluctuation on raw materials.
8. Some alloys less susceptible to radiation absorption.
9. More alloys available than some other metals.
10. Stock readily available.
11. Easy machining, with resulting greater tool life.
12. Technical literature for designing purposes readily available.

KAISER ALUMINUM

THE BRIGHT STAR OF METALS

# MEL-TROL

## at work



To deliver uniform performance between grinds, a drawing or blanking die has to be hard and tough through its whole thickness.

And no matter how well it is designed and heat treated, it can only be as uniform through the center as the bar you make it from . . . and the bar can only be as uniform as the ingot from which it is rolled.

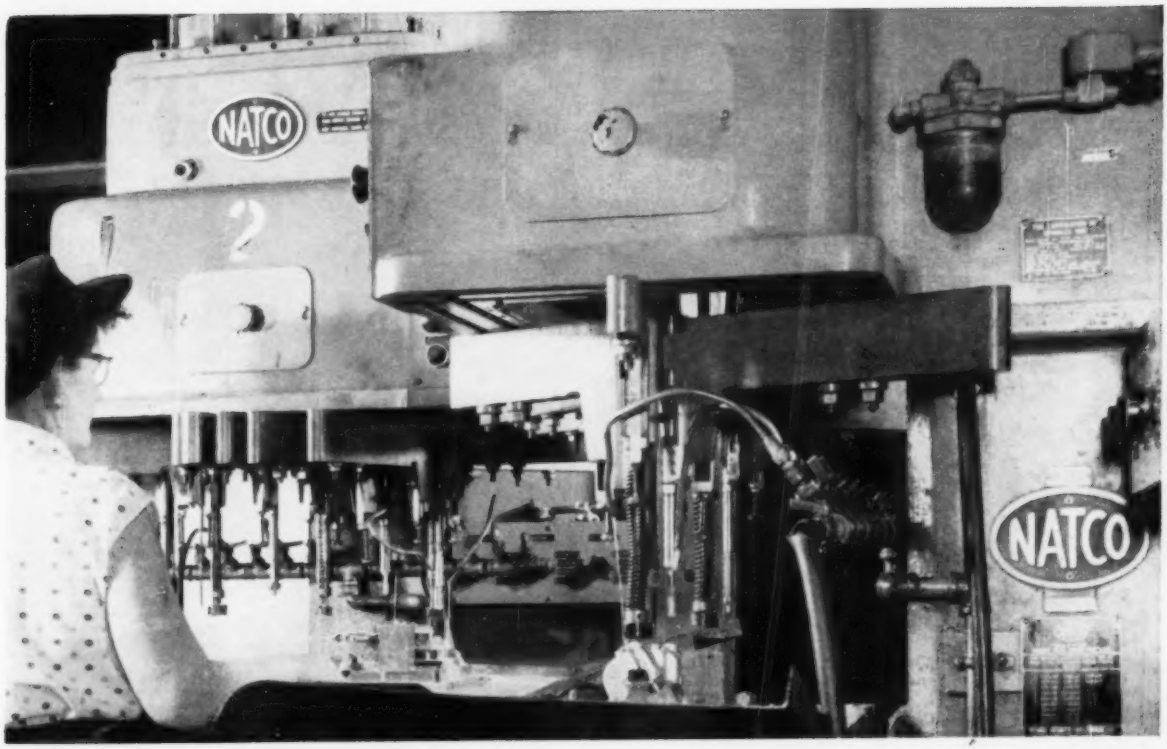
That's why, when you make a die from Carpenter MEL-TROL air hardening die steels—such as No. 484 and No. 610 —you *know* you're going to get predictable performance. The high quality of MEL-TROL die steels is guarded by a system of the most advanced and accurate quality controls ever used in steel making.

And an exclusive Carpenter-patented mold produces ingots with greater uniformity through the center than any others made on a production basis today.

Why don't you try Carpenter MEL-TROL quality tool and die steels? Call your Carpenter representative and place your order today.

**Carpenter STEEL**

*The Carpenter Steel Company, Main Office and Mills, Reading, Pa.*
*Alloy Tube Division, Union, N. J.*
*Carpenter Steel of New England, Inc., Bridgeport, Conn.*
*Webb Wire Division, New Brunswick, N. J.*




# *Ten Natcos like these replaced 170 single spindles!*

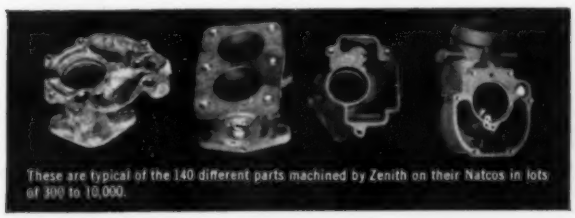
It's "reduce costs or else" in the hotly competitive carburetor business. That's why Zenith Carburetor Div. of Bendix Aviation Corp. embarked on a tooling program which resulted in substantial savings per casting machined.

Ten multiple spindle H-6 Natcos provided the greatest savings per machine dollar spent. By combining drilling and tapping operations, the Natcos eliminated the need for 170 single spindles. Look at the cost comparisons on two parts, for example—a die-cast cover and fuel bowl.

Formerly, the cover was machined by five operators using ten single spindles with ten jigs. The fuel bowl was formerly run by two operators on four single spindles using four individual jigs. Now these parts are run on two Natcos by a single operator at a direct cost savings of 81% on the cover and 70% on the fuel bowl.

Wherever hole-machining operations are performed one at a time, you'll find outstanding opportunities for cost reduction. Standard multi-spindle Natcos range from 1 hp, 10-spindle high-speed machines to giant heavy duties with 50 hp and up to 72 spindles. Natco also builds a complete line of special way-type, index and transfer machines.

A Natco field engineer can help you with your cost-reduction and production problems. Call or write today.



These are typical of the 140 different parts machined by Zenith on their Natcos in lots of 300 to 10,000.

*Somewhere in Natco's experience is a money-saving idea for YOU!*

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*Richmond, Indiana*

*Natco offices in Chicago, Detroit, New York, Buffalo, Boston, Philadelphia, Cleveland and Los Angeles; distributors in other cities.*

NATCO

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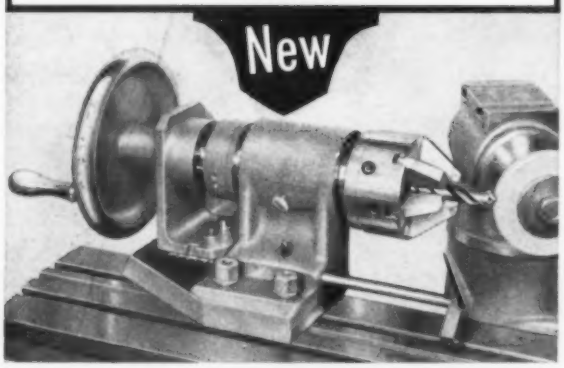


**Now!** After quick and easy set-up on Point Master, you can grind Tru-Kut drill points having any required cutting or relief angle. Also, from original set-up, duplicate drill points can be produced again and again. The Tru-Kut Point Master is comparatively low in cost and assures faster drill sharpening.

The Tru-Kut Point Master can be used on most cutter grinders, universal grinders and surface grinders. Standard grinding wheels are used. The front edge of wheel periphery is dressed to a radius that provides the self-centering "Tru-Kut" point.

Types of drills you can resharpen with the Tru-Kut Point Master for more efficient drilling are almost unlimited. You can also grind; lead angles and chamfers with radial clearance on taps; chamfers, end cuts and chip-breakers on 2-flute and 4-flute tools; chamfers and points on step-drills; thin-out webs at front; and gash cutting edges.

**TRU-KUT Drill Points Assure:**

- Rounder Holes
- Straighter Holes
- Truer sized Holes
- Practically burr-free Holes
- Less Bell-mouthing
- Self-centering drills
- Longer drill life
- Cooler cutting drills
- Cutting edges from O.D. to center of drill point
- Proper clearance on entire cutting edge of point

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Machined areas shown above prove the superior performance of the new Kennametal K-Bar over a conventional steel boring bar. Both bars operated under identical conditions . . . both were fitted with the same grade Kendex inserts and "hardware." The Kennametal sleeve encasing the K-Bar made the difference. This sleeve provided the rigidity to snuff out vibration and stop chatter because Kennametal is up to three times as rigid as the hardest steel.

The K-Bar is almost as rigid as a bar of solid Kennametal because its design concentrates the Kennametal where stress is greatest. Thus, maximum benefits are obtained to make its application to larger boring bars feasible.

Other advantages of the new K-Bar: Prevents taper, weaving, and drag-out scoring; reduces chipping and chatter-damage to cutting tips and permits use of harder grades of Kennametal for cutting high-tensile steels. On many jobs, as much metal can be removed on one pass with the K-Bar as on two or more passes with steel bars. Standard "throw-away" Kendex inserts (square, triangular or round), chipbreakers and shims are used on all K-Bars.

The K-Bar design can be applied to a wide variety of single—and multiple—point bars. Ask your Kennametal Representative for more details, or write KENNAMETAL INC., Latrobe, Pa., for descriptive bulletin and prices.

KENDEX K-Bar cross section, showing steel core encased by Kennametal sleeve

**KENNAMETAL K-BARS are available in eight sizes, from 1¼" to 2½"**

Style A—
For boring to a square shoulder

Style B—
With 15° lead angle, for straight-through boring

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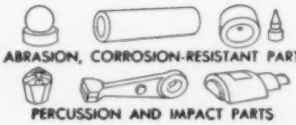

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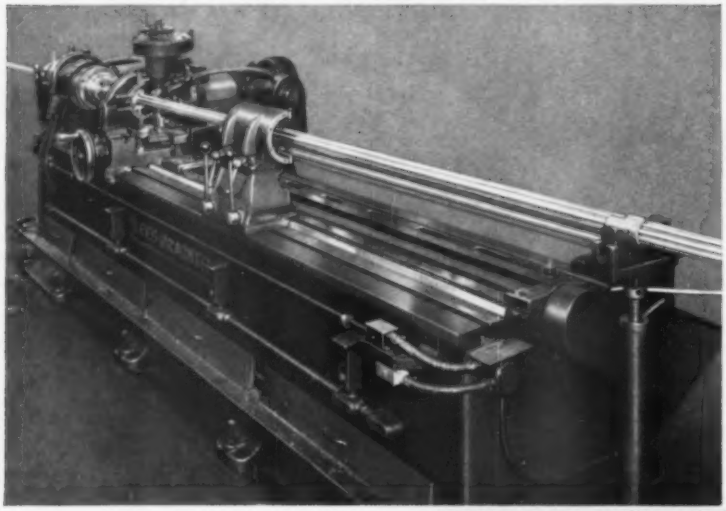

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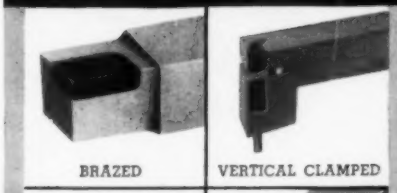
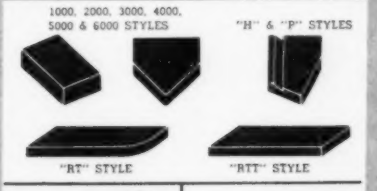
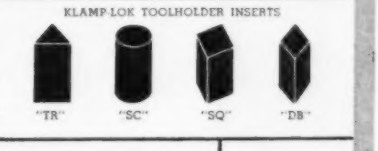
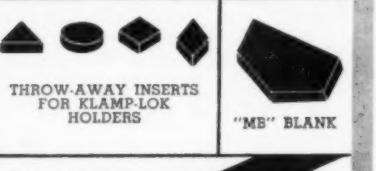
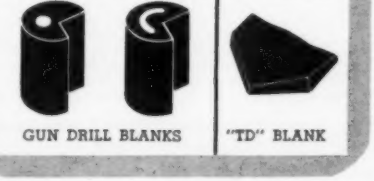
# Caterpillar REG. U.S. PAT. OFF. Tractor Co. gets results . . . with Talide S-92

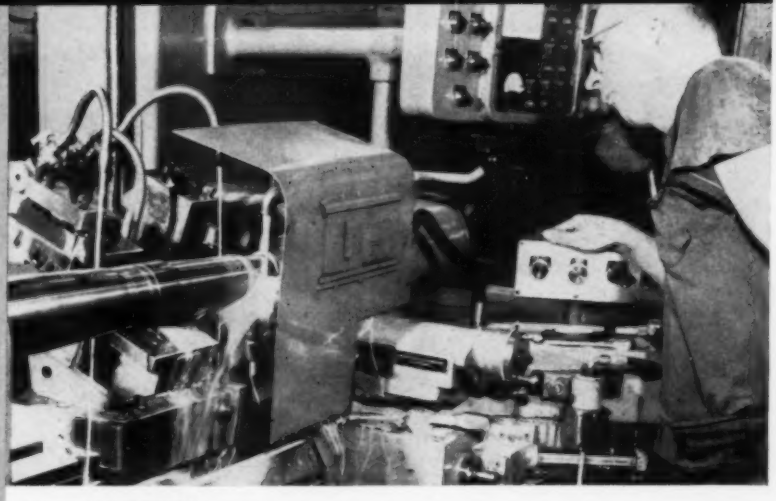




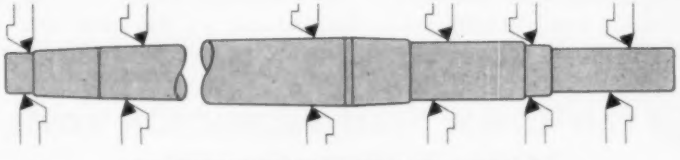




Caterpillar REG. U.S. PAT. OFF. Tractor Co., leading producer of tractors, diesel engines, motor graders and earthmoving equipment, has been using cost-cutting TALIDE tools for over 10 years to produce parts. Typical example of savings obtained is illustrated below:



## CRAWLER TRACTOR AXLE SHAFT

**Part** . . . . . Crawler Tractor Axle Shaft

**Material** . . . . . SAE 8645 Steel Forging 3¼" dia. x 38½" long, 3.6mm Brinell Hardness.

**Operation** . . . . Rough turn all diameters, form tapers, shoulders, and steps.

**Machine** . . . . . Monarch Mona-Matic No. 21 Tracer Lather, size 54".

**Tools** . . . . . 12 Talide TB-164 ½" I.C. Triangular TALIDE Throw-Away Inserts mounted in Klamp-Lok Toolholders, Grade S-92.

**Depth of Cut** . . ⅜"

**Feed** . . . . . 6" per min.—.018 F.P.R.

**Speed** . . . . . S.F.M. 387—R.P.M. 340

**Coolant** . . . . . Soluble Oil and Water

**Results** . . . . . TALIDE Grade S-92 turned 7 shafts per corner per grind for total of 42 shafts per grind. Inserts were ground an average of 6 times and produced a total of 294 shafts over life of insert. Next best premium carbide grade produced 235 shafts.

Call in a Talide sales engineer to recommend proper tooling for your machining operations, or write for 76-page catalog No. 57-G. METAL CARBIDES CORPORATION, 6001 Southern Blvd., Youngstown 12, Ohio.

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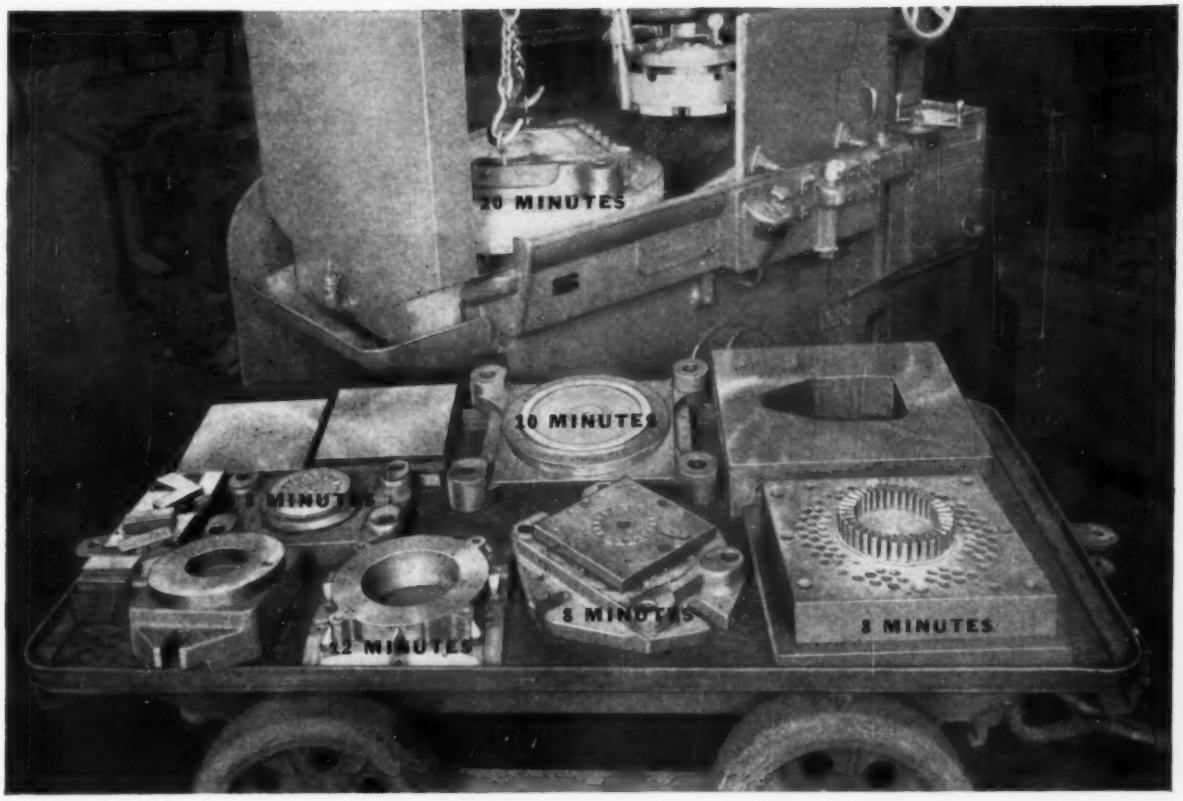


# The *EASIEST, FASTEST and CHEAPEST WAY* TO SHARPEN A DIE is to... *PUT IT ON A BLANCHARD!*

The Blanchard method of die sharpening is unequalled for speed, safety and economy. All of the dies shown are sharpened on a Blanchard No. 18 Surface Grinder with equal ease.

The rotary work motion of the Blanchard, with the wheel covering the entire surface at each revolution, enables the operator to remove the amount of stock to sharpen the die and no more! This saves time and increases the life of the die, too.

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Many shops use their Blanchards for die sharpening as well as all other surface grinding required in their manufacturing. The 3 Blanchards shown below cover work requirements from finishing tiny gears to roughing steel plates 84" across corners.

Write today for your free copy of WORK DONE ON THE BLANCHARD, Fifth Edition and "the Art of Grinding", Fourth Edition.

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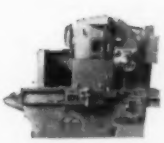
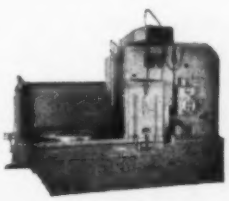


No. 18

BLANCHARD

**THE BLANCHARD MACHINE COMPANY**

**64 State Street, Cambridge, Massachusetts, U. S. A.**



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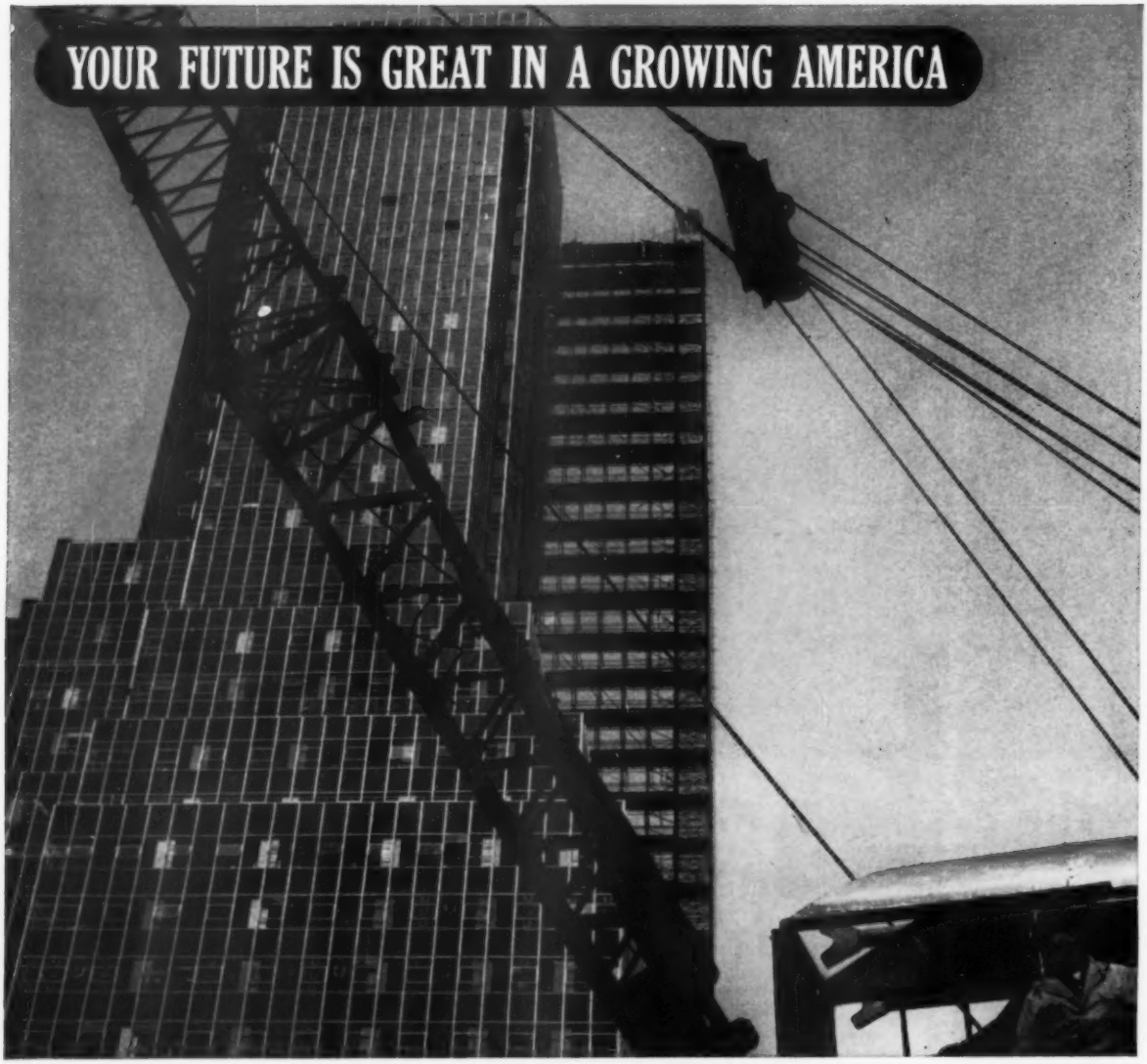


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**7 BIG REASONS FOR CONFIDENCE IN AMERICA'S FUTURE**

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**4. More Production**—U.S. production *doubles* every 20 years. We will require millions more people to make, sell and distribute our products.

**5. More Savings**—Individual savings are at highest level ever—*$340 billion*—a record amount available for spending.

**6. More Research**—*$10 billion* spent each year will pay off in more jobs, better living, whole new industries.

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BALANCER, Model 2EO Tinius Olsen, 1948
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BORING MILL, 4" bar Univ. Tri-way 1000 rpm
CENTERING MACHINES, Nos. 53 & 56 Sundstrand up to 60"
DRILL, RADIAL, 6' x 20" Western H.D., tapping
DRILL, UPRIGHT, 24" Cincinnati Bickford, tapping, No. 4 MT
GRINDERS, CYL. 4" x 12" No. H Landis, 1943
GRINDERS, CYL. 14" x 14" Model 112 Rivett Univ., 1942
GRINDERS, CYL. 20" x 72" Landis, Type D, Hyd., 1943
GRINDER, INT. 72A5 Heald, Univ., Hydr.
GRINDER, INT. No. 74 Heald Hydr., plain, 1941
GRINDER, INT. No. 75A Heald hand feed, 1941
GRINDER, SURF. 14" x 48" Mattison, Hydr., '42
GRINDER, SURF. 20" & 24" No. 25A Heald, rotary
GRINDER, SURF. 36" No. 18 Blanchard, 1940
GRINDER, CUTTER. 30" Ingersoll, 1942
GRINDER, CARBIDE, Nos. 48 & 49 Excello, 1941
GRINDER, RADIUS, No. 49 VanNorman, late
HOB SHARPENER, Type HRS Barber Colman
KELLER, BL2416 Pratt & Whitney 3 Spdl., 1941
LATHE, ENGINE, 11" & 14" South Bend, late
LATHES, ENGINE, 13", 15" & 17" LeBlond Regals, new
MILLER, HAND, No. 2RV Kent-Owens, 1942
MILLERS, No. 10 & 3 VanNorman Duplex
MILLER, UNIVERSAL, No. 2H K.&T., H.S.D.T.
MILLER, PLAIN, No. 2 Cincinnati
MILLER, VERTICAL, No. 2 Brown & Sharpe, 1943
MILLER, No. 36 VanNorman, ram type 1942
OIL GROOVER, Wiesse Continuous, 1943
ROUTERS, Type A-1R Onsrud Radial 84", late
SAW, 6" x 6" No. 6 Marvel Hack, late
SAW, 10" x 10" Racine Hydr. Hack, 1941

OVER 1,000 NEW AND USED MACHINE TOOLS IN STOCK
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2039 EAST GENESEE • SAGINAW, MICH. PL. 2-3105

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**GENERAL ELECTRIC**

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**THE SIGN OF QUALITY — THE MARK OF DEPENDABILITY**

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No. 16—22" Bryant, m.d., latest
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No. 16-A-28" Bryant, m.d.
No. 24—36" Bryant Hole & Face Type, m.d., late
No. 24-P—26" Bryant, m.d.
No. 24—21" Bryant, m.l.
No. 24-L—36" Bryant, m.d., late
No. 24-LW-36 Bryant, m.d., late
No. 44 Heald Facing Type Borematic, m.d.
No. 47A Heald Single End Borematic, m.d.
No. 640—16" Van Norman Automatic Oscillating Radius, m.d., latest
No. 70A Heald, m.d., latest, 1945
No. 72A Heald Gagematic, m.d.
No. 72A3 Heald Full Universal, m.d.
No. 72A3 Heald Gagematic, m.d.
No. 72A3 Heald Sizematic, m.d.
No. 72A3 Heald Plain, m.d.
No. 72A5 Heald Plain, m.d.
No. 73 Heald Airplane, m.d., latest, new
No. 74 Heald Long Base, 1943
No. 74 Heald Extended Bridge Type, m.d.
No. 75A Heald, m.d., latest
No. 81 Heald Gagematic, Sizematic, m.d.
No. 74 Heald, Plain Long Base, m.d., 1941
No. 104 Rivett, m.d.

No. 172 Heald Plain Adjustable Gap Hydraulic, m.d.
Model DB-102 Excello Double End Boring Machine, m.d.
Model 2TR Springfield Crown Type Vert. Univ., m.d.

**PLAIN CYLINDRICAL GRINDERS**

No. 5 Brown & Sharpe Plain Cylindrical, m.d., 1942
No. 20—10x18" cap. Brown & Sharpe, m.d.
4x12" Landis Type H Knee Hole Type, m.d.
6x15" Cincinnati Plain Hydraulic, m.d.
6x18" Cincinnati Model EA, m.d.
6x18" Landis Type C Hydraulic, m.d., late
6x18" Norton Plain Grinder, m.d.
10x18" Cincinnati Plain Hydraulic, Model ER, m.d., Filmatic Spindle, 1943
10x18" Cincinnati Model EA, m.d.
10x18" Norton Type C, m.d., latest
10x36" Norton Type C, m.d.
10x36" Landis Type CH Plain, m.d.
10x48" Cincinnati Model ER Plain Hydraulic, m.d.
12x36" Landis Plain Self-Contained, m.d.
14x36" Landis Type C, 1945
16x72" centers Type C Norton Semi-Auto. Hyd.
16x96" Cincinnati Plain Cylindrical, m.d.
16x40"x120" Cincinnati Plain Heavy Duty, 1953
16"x120" Landis Type B Plain H.D., Hyd., m.d. ,late
18"x36" Landis Type C, m.d.
18"x72" Norton Type C, mechanical, m.d.
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THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio MElrose 1-1241 "TWX" CI-174
CABLE ADDRESS EMCO

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*Every Item Guaranteed as Represented*

**No. 3, No. 4 Cincinnati Vert. H.S.D.T. Mills, Late Type.**

24", 36", 42" BULLARD Vertical Turret Lathe, Turret Hd., Side Hd., M.D. Spiral.

No. 4, 5 WARNER & SWASEY Univ. Preselector Turret Lathes, Bar Feed & Chucking.

**24" x 24" x 96" MATTISON Hyd. Surf. Grinder, 1943. Mag. Chuck, Barnes Mag. Separator.**

3'11", 3'x13", 5'x15" Cinc.-Bickford Super Service Motor on Arm. Radial.

12" x 36" NORTON UNIV. CYL. GRINDER

**No. 56-90 CINCINNATI Duplex Hydromatic Mill, Late Type.**

½B x 30" Pratt & Whitney Deep Hole Drill.

No. 3, 4 CINCINNATI HSDT Horiz. Mills, Vert. Heads Extra Table Travel, 1945.

**32" x 12' centers FARREL Traveling Table Type Roll Grinder, New in 1942. Excellent condition.**

6" x 18", 6" x 10" x 48" NORTON Hydraulic Horiz. Surface Grinder, Perm Chuck.

No. 2112A EXCELLO Boromatic Single End Double Head, Late Type.

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BUY FROM STOCK
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**SELECT MACHINE TOOLS**

1A—Warner & Swasey Turret Lathe Preselector Head late type assortment of tooling
3'11" column American Holewizard Radial Drill, motor on head, 12 speeds, late.
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16" x 40" x 96" centers Norton Type "C" Cylindrical Grinder, two gaps, swing 40" and 28" in gaps, mechanical feed, late type.
16" x 54" centers Boye & Emmes G. H. Lathe, 12 spindle speeds, timken, late taper.
16" x 54" Centers Lodge & Shipley new 1951 12 spindle speeds, taper attachment.
20" Gould & Eberhardt Industrial Shaper, vise, front support, new 1947.
24" x 96" centers Boye & Emmes G.H. Lathe, 12 speeds, timken, late, tapor.
42" Bullard Spiral Drive Vertical Boring Mill, extra high column, 4 jaw chuck table.
54" Bullard spiral drive vertical boring mill, 30 HP motor, 4 jaw chuck table.
3½" bar Cincinnati Gilbert table type boring mill, AC motor, vertical travel of head on column 72", table 43" x 78½".

# Cincinnati Machinery
COMPANY, INCORPORATED

3901 Kellogg Ave., Cincinnati 26, Ohio
Phone TRinity 1-0853

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# FLAT GRINDING

• BLANCHARD • HORIZONTAL
*Up to 85" dia. & up to 24" x 144"*
*SHEAR BLADES SHARPENED — up to 12'*

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SQUARING SHEARS • PRESS BRAKES
REBUILT and GUARANTEED

WILL LEASE WITH OPTION TO PURCHASE, OR WILL FINANCE OVER LONG TERM

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**WARNER and SWASEY 5-spindle Chucker**

*Contact* **Kenneth R. Lung or Louis Wozar**

**THE TAIT MANUFACTURING CO.**
DAYTON, OHIO

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# FOR SALE

A NEW FLOOR-MOUNTED DANLY PRESS, used for exhibition purposes only, Type D2-400-84-42, is now ready for immediate shipment. Type of press — straight side, double action, overdrive, two point suspension on inner slide, four point on blankholder, crankshaft type, triple geared press with right to left shafts and of welded steel, four piece, tie rod construction. Strokes per minute 15. Electrical Controls. Press incorporates every advanced feature for operational economy, safety and ease of operation. Specific details available by requesting Project No. 6458. Manufacturer:

DANLY MACHINE SPECIALTIES, INC.
2100 S. Laramie Avenue, Chicago 50, Ill.

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**PITTSBURGH SUMMERFIELD ENGINE LATHE**

36" x 50' betw. ctrs. Late model, geared head two (2) carriages, AC motor, power rapid traverse, excellent condition, timken bearing. Can be seen in operation.

FS-8636, AMERICAN MACHINIST
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

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# SEARCHLIGHT EQUIPMENT SPOTTING SERVICE

This service is aimed at helping you, the reader of "SEARCHLIGHT," to locate rebuilt and used machine tools and equipment. Not currently advertised. (This service is for USER-BUYERS only) No charge or obligation.

HOW TO USE: Check the dealer ads to see if what you want is not currently advertised. If not, send us the specifications of the equipment and/or components wanted on the coupon below, or on your own company letterhead to

**SEARCHLIGHT EQUIPMENT SPOTTING SERVICE**
**330 W. 42nd Street, N. Y. 36, N. Y.**

Your requirements will be brought promptly to the attention of the equipment dealers advertising in this section. You will receive replies directly from them.

Searchlight Equipment Spotting Service
c/o Classified Advertising,
AMERICAN MACHINIST
330 W. 42nd Street, N. Y. 36, N. Y.

Please help us locate the following equipment:

NAME ..... TITLE .....
COMPANY .....
STREET .....
CITY ..... ZONE ..... STATE .....

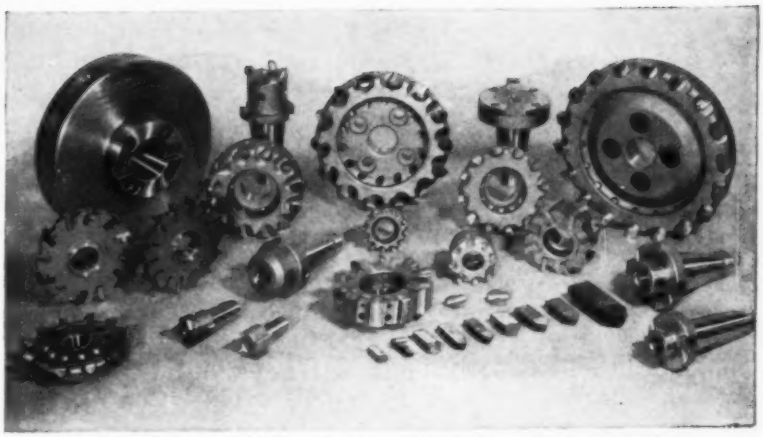
8/25/58

# INDEX TO ADVERTISERS

*This index is published as a convenience to the readers. Every care is taken to make it accurate, but American Machinist assumes no responsibility for errors or omissions.*


| | Page |
|---|---|
| Allegheny Ludlum Steel Corporation | 156 |
| Allen Mfg. Company | 107 |
| American Tool Works Co. | 63 |
| Ames Company, B. C. | 34 |
| Amplex Div., Chrysler Corporation | 33 |
| Armstrong Blum Mfg. Co. | 144 |
| Armstrong Brothers Tool Company | 32B |
| Avey Division Motch & Merryweather Co. | 30-31 |
| Bethlehem Steel Company | 131 |
| Bilgram Gear & Machine Company | 154 |
| Blaisdell Pencil Co. | 132 |
| Blanchard Machine Company | 147 |
| Bliss Co., E. W. | 119 |
| Brown & Sharpe Mfg. Co. | 43, 47 |
| Bryant Chucking Grinder Company | 134 |
| Buhr Machine Tool Company | 112A, 112B, 112C, 112D |
| Bullard Company | 52 |
| Burg Tool Mfg. Company, Inc. | 40-41 |
| Card, S. W., Division Union Twist Drill Co. | 36 |
| Carlton Machine Tool Company | 38 |
| Carpenter Steel Company | 140 |
| Century Electric Company | 120-121 |
| Cincinnati Gilbert Machine Tool Co. | 50 |
| Cincinnati Lathe & Tool Company | 35 |


(*Continued on page 152*)

Milling Cutters — End Mills — Blades — Boring Tools — Arbors — Flywheels

## These Lovejoy Products can help you Cut Costs!

The entire line of Lovejoy Milling Cutters and Accessories is designed to aid you in getting better production at less cost.

If you are not now using Lovejoy products, we invite you to do so at first opportunity.

Lovejoy precision-engineered tools include:

**Inserted-tooth milling cutters** (face, side, end, slotting and boring) which feature husky, forged steel housings; exclusive Lovejoy "positive-locking" blade assembly; a variety of dozens of models and hundreds of sizes.

**Blades:** H.S.S., Vasco Supreme and carbide. These are interchangeable over a wide range of housing sizes, and Type "A" face milling blades will fit any standard Lovejoy Type "A" cutter of 4½" to 24" dia. All Lovejoy blades are carried in stock, ready for immediate shipment. Special cutters are a Lovejoy specialty.

### NEW "JOYDEX"

This performance-proved face mill features indexable blades for low cost-per-edge cutting. Exclusive design improvements include — adjustable anvils • extra deep chip flutes • fast, easy indexing • sweep blades for fine finish • double positive, or combination positive and negative rake angles merely by changing blades • rugged, one-piece body • large locking screws. *Try out a new "Joydex" and prove its superiority! ("Joydex" data sheet is yours for the asking).*

**Catalogs** — include: "Face Mill Catalog No. 31; Side Mill Catalog No. 32; Type "S" Bulletin; Arbor Catalog No. 33; "Speed and Feed" Calculator. Write today for copies desired.

**LOVEJOY TOOL COMPANY, INC.**
Springfield, Vermont, U.S.A.

# Why MICROHONING AT EVINRUDE

## trims costs . . . booms productivity . . . eliminates operations...improves quality

Evinrude Motors, Division of Outboard Marine Corporation, has replaced with Microhoning their former method of processing conn bores. Here's why:

### MICROHONING INCREASES PRODUCTIVE CAPACITY 23 TIMES

Before Microhoning equipment was installed, Evinrude used diamond boring on wristpin and crankpin bores. Now! A per-man productivity comparison of the two processes shows: diamond boring, 300 rods in 40 hours; *Microhoning, 7,000 rods in 40 hours.*

*Shown to the left is one of two lines of Microhoners. Each machine has: Microdial automatic stone-feed and stone-wear compensation; automatic stone-wear indicator; and Microsize Gage Ring automatic sizing control.*

### REDUCES OPERATIONS

Greatest cost-cutting contribution made by Microhoning is *elimination of three former operations:*

1. Re-milling locating faces of wristpin bores.
2. Straightening of rods after boring.
3. Milling oil hole grooves in wristpin bores.

### ELIMINATES BRONZE INSERTS

The functional surface characteristics of Microhoned rod bores preclude the need for bronze bushings or shoes. Based on current production schedules, *the cost of millions of bronze inserts will be saved this year.*

### ASSURES FEWER REJECTS

From a Microhoning run of 62,000, receiving 100% inspection on an air gage, only 200 rods required reprocessing. *This is a rejection rate of only 3/10 of 1%.*

### IMPROVES PRODUCT QUALITY

Microhoning is a low-velocity abrading process that leaves bore surfaces free of torn, smeared or burned metal. Benefit: *Rods that have precise, longer wearing bores.*

*To learn more of why Microhoning provides efficient stock removal, closer tolerances and functional surfaces, write to:*

**MICROMATIC HONE CORP.**

8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN


## INDEX TO ADVERTISERS

*(Continued from page 151)*


| | Page |
|---|---|
| Cincinnati Milling Machine Co. | 4-5 |
| Cincinnati Milling Machine Co. Grinding Machine Division | 16-17 |
| Cincinnati Shaper Company | 66 |
| Cleveland Crane & Engineering Co. | 133 |
| Columbus Die-Tool & Machine Co. | 146 |
| Cross Company | 28-29 |
| Delta File Works, Inc. | 126 |
| Detroit Reamer & Tool Company | 142 |
| DeVilbiss Company | 137 |
| duMont Corporation | 44 |
| Dykem Company | 144 |
| Eagle-Picher Company | 124 |
| Eastman Kodak Co. Apparatus & Optical Division | 105 |
| Economy Engineering Company | 135 |
| Ex-Cell-O Corporation | 26-27 |
| Farquhar Div., A.B., Oliver Corp. | 123 |
| Fellows Gear Shaper Company | 6-7 |
| Fenn Manufacturing Company | 118 |
| Foote-Burt Company | 89 |
| Gaertner Scientific Corporation | 135 |
| Gardner Machine Company | 21 |
| German Factory | 142 |
| Gisholt Machine Company | 39 |
| Gleason Works | 3 |
| Goss & de Leeuw Machine Company | 115 |
| Grant Mfg. & Machine Company | 136 |
| Greaves Machine Tool Company | 136 |
| Greenlee Brothers & Company | 54 |
| Hamilton Tool Company | 154 |
| Hardinge Brothers, Inc. | 20 |

## INDEX TO ADVERTISERS


| | Page |
|---|---|
| Heald Machine Company Sub. Cincinnati Milling Machine Co. | 2nd Cover |
| Hoover Ball & Bearing Co. | 122 |
| Hydraulic Press Mfg. Co. Div. of Koehring Company | 64 |
| Jones & Lamson Machine Company | 32 |
| Kaiser Aluminum & Chemical Sales, Inc. | 138-139 |
| Kennametal, Inc. | 143 |
| Kingsbury Machine Tool Corp. | 111 |
| Landis Machine Company | 10-11 |
| Landis Tool Company | 12-13 |
| Lees-Bradner Company | 144 |
| Leland-Gifford Company | 45 |
| Linley Brothers Co. | 135 |
| Lodge & Shipley Company | 56 |
| Lovejoy Tool Co., Inc. | 151 |
| Ludwigsburger Maschinenbau GMBH | 127 |
| Lufkin Rule Co. | 155 |
| M. B. I. Export & Import Ltd. | 46 |
| McDonough Manufacturing Co. | 132 |
| Metal Carbides Corp. | 145 |
| Micromatic Hone Corp. | 152-153 |
| Morse Twist Drill & Machine Co. | 8-9 |
| National Acme Company | 24-25 |
| National Automatic Tool Co., Inc. | 141 |
| Nelco Tool Co. | 47 |
| New Britain Machine Company | 48A, 48B |
| Norton Company | 18, 19, 32A |
| Oliver Corp., A. B. Farquhar Div. | 123 |
| Orban, Inc., Kurt | 109 |


(*Continued on page 154*)


# How MICROHONING AT EVINRUDE trims costs . . . booms productivity . . . eliminates operations...improves quality

By installing Microhoning equipment to process wristpin and crankpin bores in conn rods, Evinrude Motors, Division of Outboard Marine Corporation, realized considerable savings. The following comparison with previously used diamond boring shows how Microhoning cut time, materials and costs:

## MICROHONING BOOSTS PRODUCTIVE CAPACITY 23 TIMES

Diamond Boring Production Per Man: 300 rods in 40 hours.

*Microhoning Production Per Man: 7,000 rods in 40 hours.*

Several rod sizes are Microhoned on the same equipment — bore diameters range from .874″ to 1.500″, bore lengths from .815″ to 1.011″. Microhoning removes .005″ stock from wristpin bores in about 24 seconds (floor-to-floor) and generates a controlled finish of 25 to 30 microinches as specified. On crankpin bores, Microhoning removes .0005″ stock to generate specified finish of 3-5 microinches in 17 seconds (F-T-F). Tolerances on both bores are held to .0001″ for roundness and straightness, and .0004″ on diameter.

*Close-up of double unit Microhoner shows operator checking a wristpin bore on air gage. Microdial, which automatically compensates for abrasive wear, is shown in center of photo.*

## ELIMINATES THREE OPERATIONS

**1.** Former re-milling of locating face on wristpin bore is eliminated — *Microhoning's float principle maintains original bore location.*

**2.** Straightening after rough boring is no longer required — *Microhoning tool follows neutral axis of bore.*

**3.** Milling oil hole grooves in wristpin bores is eliminated — *Microhoning generates a cross-hatch pattern that provides built-in oil reservoirs.*

## SAVES COST OF MILLIONS OF BRONZE INSERTS PER YEAR

Microhoning's low-velocity abrading, with efficient cutting over a wide area, produces surfaces free of torn, smeared or burned metal.

Result: Precise bores having surfaces that resist galling and flaking.

*Benefit: User obtains longer wearing rod bores and a functional supplanting of bronze inserts.*

*For further information on Microhoning process or to receive movie "Progress in Precision", write to:*

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

# VARIMATIC®

**The SUPER SENSITIVE, SMALL-HOLE, PRECISION DRILLING MACHINE**

With capacity of .004" to 5/16" in *all* drillable materials, and spindle speeds from 840 to 9300 R.P.M. infinitely variable in two speed ranges . . . *this* is the machine which the precision industries rely upon to handle the "heart-break jobs."

*"for the finest work you do"*

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## INDEX TO ADVERTISERS

*(Continued from page 153)*


| | Page |
|---|---|
| Osborn Mfg. Co. | 42 |
| Republic Steel Corp. | 14-15 |
| Rotor Tool Company | 60 |
| Ryerson & Son Inc., Joseph T. | 58 |
| Scherr Co., Inc., George | 142 |
| Scott Paper Company | 117 |
| Sealol Corporation | 136 |
| Sidney Machine Tool Company | 112A, 112B, 112C, 112D |
| Sinclair Refining Co. | 90 |
| Snyder Tool & Engineering Co. | 3rd Cover |



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# INDEX TO ADVERTISERS


| | Page |
|---|---|
| Standard Screw Co. | 113 |
| Starrett Co., L. S. | 96 |
| Steelweld Machinery Division Cleveland Crane & Engineering Co. | 133 |
| Sundstrand Machine Tool Company | 22-23 |
| Taft-Peirce Mfg. Co. | 128-129 |
| Timken Roller Bearing Company Steel & Tube Division | 4th Cover |
| Union Twist Drill Company | 37 |
| United States Drill Head Company | 48 |
| Vickers, Incorporated Division Sperry Rand Corp. Electric Products Division | 114 |
| Vlier Engineering Corporation Sub. Barry Controls, Inc. | 92 |
| Wales Strippit Company | 130 |
| Walker Co., Inc., O. S. | 116 |
| Wiedemann Machine Company | 125 |
| Wood Company, R. D. | 94 |


## CLASSIFIED ADVERTISING

**F. J. Eberle, Business Mgr.**


EMPLOYMENT OPPORTUNITIES ..... 149

EQUIPMENT
(Used or Surplus New)
For Sale ..... 149-150

ADVERTISERS INDEX
Cincinnati Machinery ..... 150
Danly Machine Specialties Incorp. .... 150
The Eastern Machinery Co. ..... 150
Falk Machinery ..... 150
General Electric ..... 149
Joseph Hyman & Sons ..... 150
Sal Metal Products Co. ..... 150
Miles Machinery ..... 150
S & S Machy. Co. ..... 149
The Tait Manufacturing Co. ..... 150

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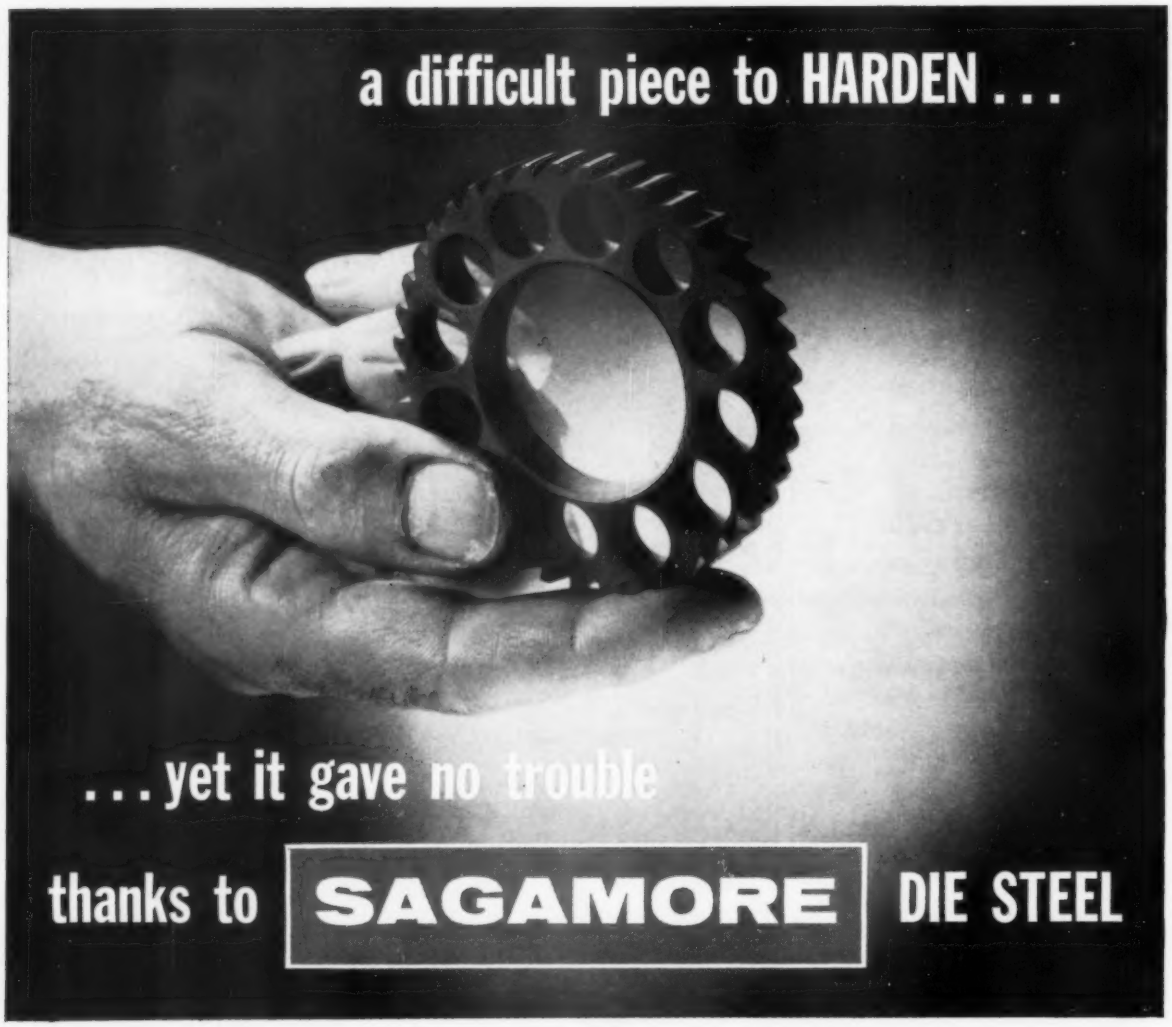


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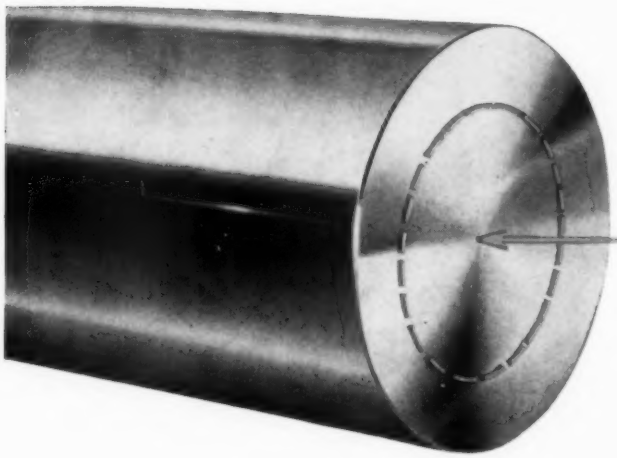

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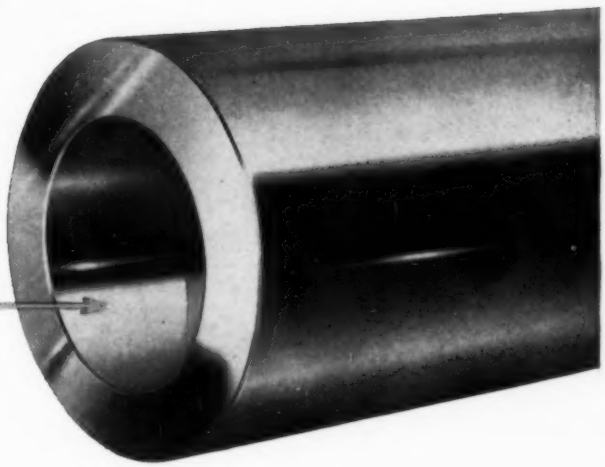

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